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Report No. P-3708-KO

REPORT AND RECOMMENDATION

OF THE

PRESIDENT OF THE

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

TO THE

EXECUTIVE DIRECTORS

ON A

PROPOSED LOAN

IN THE AMOUNT EQUIVALENT TO US$100 MILLION

TO THE

REPUBLIC OF KOREA

FOR A

PROGRAM FOR SCIENCE AND TECHNOLOGY EDUCATION

May 2, 1984

CURRRENCY EQUIVALENT

W 800 = $1.00
W 100 = $0.125
(As of April 30, 1984)

GOVERNMENT OF KOREA
FISCAL YEAR

January 1 - December 31

ACADEMIC YEAR

September - July

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

EPB	-	Economic Planning Board
FFYP	-	Fifth Five-Year Plan
GEB	-	General Education Bureau
GHS	-	General High School
KAIST	-	Korea Advanced Institute of Science and Technology
KCUE	-	Korea Council for University Education
KEDI	-	Korea Education Development Institute
KOSEF	-	Korea Science and Engineering Foundation
MOE	-	Ministry of Education
MOST	-	Ministry of Science and Technology
NIERT	-	National Institute for Educational Research and Training
OSROK	-	Office of Supply, Republic of Korea
R&D	-	Research and Development
RSC	-	Regional Science Center
SEDC	-	Science Education Development Committee
SOE	-	Statement of Expenditure

KOREA

PROGRAM FOR SCIENCE AND TECHNOLOGY EDUCATION

Loan and Program Summary

Borrower: The Republic of Korea

Amount: $100 million equivalent (including capitalized front-end fee)

Terms: 15 years including three years of grace, with interest at the standard variable rate.

Program Description: The basic objective of the science and technology education sector program is to improve the quality of Korean education in these fields, in furtherance of the country's skill, knowledge and technological requirements in the 1980s and beyond. The sector program includes policy and institutional changes and selective investments designed to: (a) control the quality of graduate- and college-level education; (b) concentrate graduate education in a few key institutions; (c) strengthen an institution for research funding and promotion; (d) improve collaboration between academic institutions and research institutes; (e) establish an institution for advanced training and research and development in science education; (f) adjust the college admissions procedures to reward student achievement in school, including performance in laboratory-based assignments; (g) introduce new secondary science courses with a greater emphasis on practical work; (h) strengthen monitoring and evaluation procedures; (i) recruit and upgrade teaching staff; and (j) improve facilities and equipment. The overall program, of which a part would be financed under the proposed loan, would comprise (i) about five national programs, for accreditation assistance, research grants, staff development, equipment for secondary schools and regional science centers, and studies; and (ii) about 60 subprojects for equipment requirements of specific graduate schools and colleges.

By 1990 the sector would supply about 7,000 students per year at the graduate level in science or engineering, 18,000 per year at the college level in science or science education, and 400,000 students per year from general high schools with an improved science curriculum. The proposed loan entails some risk with regard to complexity of policy and institutional changes and the management burden. A system of program monitoring, including annual joint and mid-term reviews by the Bank and the Borrower, would substantially mitigate this risk.

Program Cost: (for the period July 1984 - June 1988)

	Local	Foreign	Total
		$ million	
Graduate Training and Research	90.2	102.4	192.6
College Science Education	77.8	80.7	158.5
Secondary Science Education	100.9	90.5	191.4
Total Base Cost	268.9	273.6	542.5
Contingencies:			
Physical	26.8	27.4	54.2
Price	50.3	48.1	98.4
Total Program Cost /a	346.0	349.1	695.1
Front-end Fee on Bank Loan	0.0	0.2	0.2
Total Financing Required	346.0	349.3	695.3

/a Total program cost includes indirect taxes and duties estimated to be about $21 million or 3% of total program cost. Imported equipment and materials would be exempt from duty

Financing Plan:	Government	Private	Proposed IBRD loan	Total	% IBRD financing
		$ million			
Graduate Training and Research	120.1	32.2	40.3	192.6	21
College Science Education	99.6	30.0	28.9	158.5	18
Secondary Science Education	114.4	68.3	8.7	191.4	5
Total Base Cost	334.1	130.5	77.9	542.5	14
Contingencies	93.9	36.8	21.9	152.6	14
Total Program Cost	428.0	167.3	99.8	695.1	14
Front-end Fee on Bank loan	0.0	0.0	0.2	0.2	100
Total Financing Required	428.0	167.3	100.0	695.3	14

Estimated Disbursement from Bank Loan:

Bank FY	1985	1986	1987	1988	1989
	$ million				
Annual	5	12	28	40	15
Cumulative	5	17	45	85	100

Rate of Return: N.A.

Staff Appraisal Report: No. 4891-KO dated May 1, 1984.

REPORT AND RECOMMENDATION OF THE PRESIDENT
OF THE INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT
TO THE EXECUTIVE DIRECTORS ON A PROPOSED LOAN
TO THE REPUBLIC OF KOREA
FOR SCIENCE AND TECHNOLOGY EDUCATION

1. I submit the following report and recommendation on a proposed loan to the Republic of Korea, for the equivalent of $100 million to help finance the Government's Program for Science and Technology Education. The loan would have a term of 15 years including 3 years of grace at the standard variable interest rate.

PART I - THE ECONOMY

2. The latest Economic Report entitled "Korea: Adjusting to a New World Environment" was distributed under cover of Sec M82-514 dated June 1, 1982. The following summary is based on this Report together with updating information obtained during Bank missions in July and November/December 1983. The Country Data Sheets are attached as Annex 1.

Past Performance

3. Twenty years ago, Korea was one of the poorest developing countries, heavily dependent on agriculture, with a weak balance of payments position financed almost entirely through foreign grants. But the ability to sustain a growth rate of 8% p.a. from 1960 onwards had raised Korea's per capita income from $80 in 1960 to $1,700 in 1982 (both in current prices), with more than 80% of the population above the poverty line, and enabled her to join the ranks of the semi-industrial nations. During this period, the share of the manufacturing sector in GNP rose from 14% to 29% while the share of agriculture fell from 39% to 17%. Merchandise exports, principally manufactured goods, accounted for almost 41% of GNP as against a mere 4% two decades earlier and the balance of payments position had been considerably strengthened.

4. Rapid industrial growth also brought about a marked shift in the structure of employment. In the early sixties well over half the labor force had been employed in agriculture. By 1982, employment in this sector had fallen to a third, while manufacturing absorbed over 22% of the employed. Heavy migration from the rural areas to the cities combined with deliberate Government policies to improve the agricultural terms of trade and a steady increase in agricultural value added helped to ensure growth in per capita rural incomes more or less in line with the rest of the economy through the first half of the 70s. There was some deterioration in the income levels of the rural households between 1978-81 but this appears to have now been reversed.

Adjustment to Oil Crises and Domestic Shocks, 1974-82

5. Foreign borrowing, an increase in public sector savings, and export diversification resulting from an ambitious industrial policy enabled the country to negotiate the first oil crisis without faltering, and thereafter, to grow by 10% p.a. until 1978. However, the very success of the Korean planners in stimulating the economy generated serious inflationary pressures. Real wages rose at an average annual rate of 18% between 1975-78, well in excess of the growth in productivity, and by 1978 the Consumer Price Index (CPI) was increasing at over 18% p.a., compared to a rate of 10% in 1977. In addition, the large volume of subsidized credit which was made available to the heavy and chemical industries by the financial system under the Government's direction, brought about an excessive expansion of capacity in subsectors faced with weak demand while the traditional light industries were frequently starved of funds. This trend was in line with the Government's view of Korea's changing comparative advantage, but it created structural imbalances in the manufacturing sector and in conjunction with exchange rate rigidity and a rising price level, dampened export growth in the latter part of the 1970s.

6. The Government announced, in April 1979, a far reaching program of stabilization-cum-restructuring to contain price pressures and revive exports, but it was overtaken by a series of unexpected shocks. The oil price adjustment by OPEC raised Korea's petroleum import bill from about $2.3 billion in 1978 to $6.2 billion in 1980 with the price-induced increase equal to nearly 6% of GNP in 1980. In October 1979, President Park Chung Hee, the chief architect of Korea's "economic miracle" since the mid-sixties, was assassinated. This was followed by a period of the severest political uncertainty and social unrest in twenty years (with the situation returning to normal only after a new Administration under President Chun Doo Hwan was installed in September 1980). On top of these developments, unfavorable weather reduced agricultural output by about 22% in 1980, or over 4% of GNP, and a 20% decline in investment led to a worsening of deflationary pressures which could not be offset by the 10% growth of export volume. As a result, GNP fell by 6.2% in 1980, unemployment increased to 5.2% from 3.2% in 1978 and the higher costs of fuel, raw materials and foodstuffs pushed up consumer prices by 29%.

7. To stabilize the economy and promote external adjustment, the Government attempted, with some success, to restrain wages. It also adopted a system of managed float, as a consequence of which the effective exchange rate was cut by 30% in 1980. Improved competitiveness and weak domestic demand allowed export volume to increase by 10% in 1980 and a further 17% in 1981. This very sizeable expansion in trade brought about a narrowing of the current account deficit from $5.3 billion in 1980 (9.4% of GNP) to $4.6 billion (7.4% of GNP) in 1981. Meanwhile a 0.3% cut in real wages following on the heels of a 5.0% drop in the previous year, together with some levelling off of import prices, led to an easing of inflationary pressures. These favorable developments continued through 1982, a year which saw inflation declining to 7.3% and the payments deficit to 3.9% of GNP, largely because of movements in the terms of trade favoring Korea, modest success on the wages front and rather more conservative fiscal and monetary policies.

8. While these changes in key macroeconomic indicators offered heartening evidence of progress with adjustment, growth in 1982 (5.3%) was appreciably below expectations, as consumer and investment demand increased only moderately, and the 6% rise in exports came largely from a surge in sales of ships. Hence, in the first half of 1983 the Government moved to stimulate domestic economic activity by concentrating a larger proportion of the total budgeted public expenditure in the earlier part of the year. This served to stimulate construction activities in the public sector, but the expectations generated by the Government's counter cyclical action together with the prospects of a revival in international demand, also triggered a boom in the private housing and real estate markets, and in the industries supplying inputs for construction activities. The recovery in export demand for electronics, machinery and transport subsectors from about the middle of 1983 helped to sustain the tempo of economic activity through the last two quarters with the result that GNP grew by over 9%.

Medium-Term Prospects

9. When the Fifth Five-Year Plan (1982-86) was prepared two years ago, a growth rate of 7.6% p.a. was projected with export volume increasing by 11% annually and the current account deficit declining gradually to $3.6 billion by 1986. But with the balance of payments performance running well ahead of the Fifth Plan targets and planners more sanguine regarding the economy's growth prospects, the Government recently completed a revision of the Plan. Many of the objectives enunciated in the earlier version of the Plan which have been pursued with considerable success have been retained, such as: (a) price stability, (b) a lowering of trade barriers, (c) financial liberalization, (d) energy conservation and diversification by type and source, (e) increased spending on social programs and (f) strengthening of the new export industries. But the revised Plan underscores the need for Korea to contain external borrowing thereby minimizing the expansion of its large external debt. Technology absorption from abroad and the creation of domestic research capability, seen as the key to future export dynamism, also receives more attention. In addition, the quest for efficiency in the management and allo- cation of resources, especially in the public sector, has been sharpened. The austere public expenditure program calling for a balanced budget (general account) by 1984 and the equally stringent monetary policy which has been in force over the past year, should facilitate a progressive reduction in the size of the current account deficit, with domestic savings being encouraged by generous real interest rates for depositors (4-5% in 1983) and price stability (2% inflation in 1983). Technology transfer is being accelerated by integrat- ing and expanding the efforts to induce direct foreign investment, increase funding for research and venture capital for high technology firms, by improving the quality of researchers in scientific institutes and encouraging the large corporations to raise expenditures on R&D. Lastly, a reform of public enterprise management, now being reviewed, should contribute significantly to the cause of efficiency.

10. During the 1970s, Korea's growth rate was extremely high - averaging 9.6% p.a. Such a performance might not be easily repeated in the current decade given the trends in the international system and the very size of Korea's economy and trade. But an increase in the GNP averaging 7-8% annually

could well be achieved, if the appropriate policies are followed, through a 9-10% expansion in exports combined with judicious enlargement of domestic demand.

External Resource Balance

11. While total debt is high in absolute amounts and equal to 57% of GNP in 1983, the total debt service ratio (including interest on short-term debt) was still a moderate 21%. These ratios in fact exaggerate the debt burden somewhat as they include loans used for the purpose of financing the rapidly rising exports of capital goods (most prominently ships) without showing the balancing effect on net foreign debts of rising foreign exchange claims on the rest of the world. The high share of short-term maturities in total debt (35%) is the most unfavorable aspect of the debt situation, but under the Stand-By Agreement with the IMF, special attention is being given to its reduction over the next 12 months. The gross borrowing program envisaged by the Government (about $6 billion p.a. through 1986) though fairly large in absolute amounts, is realistic in terms of availability, and prudent in terms of Korea's debt service capacity provided that the export projections are realized and the borrowing rates decline. With such a level of borrowing, Korea's external debt as a ratio to GNP would decline to below 45% in 1986, while the debt service ratio would fall to 17%. Although this is lower than the debt service ratios projected for many other newly industrializing countries, the magnitude of Korea's outstanding debt and the lowered tolerance of bankers towards risk, suggest that it would be desirable for the current account deficit to be kept below 2% of GNP for 1986, which appears feasible.

PART II - BANK GROUP OPERATIONS

12. As of March 31, 1984, Korea had received 72 Bank loans (including one Third Window Loan) and 8 IDA Credits, totalling $5,105.27 million in loans and $115.58 million in credits (taking into account cancellations and the refinancing of one IDA Credit in a subsequent Bank loan). As of that date, $1,452.27 million remained undisbursed on effective loans, mostly from commitments in the past two years. Annex II contains a list of outstanding Bank loans, IDA Credits, and IFC Investments as of March 31, 1984. Progress on project implementation is generally satisfactory, and implementation delays have been addressed which had occurred in several projects - mainly irrigation, highways and population - due primarily to shortfalls in Government budgetary contributions resulting from cost overruns during a period of high domestic inflation. The issue has been reviewed with the Government which has taken measures to increase local funding of Bank-financed projects. However, as the Government's budgetary situation continues to be tight, the status and plans for counterpart contributions will remain an integral part of country implementation reviews held jointly with the Government. Nevertheless, despite the recent delays, Korea's disbursement rate remains the highest among major Bank borrowers in East Asia.

13. The current pipeline of projects in the lending program for Korea reflects an evolution in the Bank's strategy from lending for discrete

projects concerned with micro-institutional issues increasingly to making sector loans which are aimed at addressing broad-based policy and institutional issues. This transformation in the Bank's lending approach, made possible by the relatively sophisticated Korean institutions, is working well. Sector loans have already been made for Education and Industrial Finance and are under preparation for the Agriculture and Urban sectors. The Bank has also made two Structural Adjustment Loans (SALs), which complement this approach by concentrating on issues that have macro and multi-sectoral impact.

14. Bank lending for the industrial sector is aimed at helping improve Korea's trade and industrial incentives policies, at improving the performance of the financial system and at developing the technological capabilities of Korean enterprises. So far trade and incentives issues have been addressed through the SAL. Issues pertaining to the strengthening of the financial system are being addressed under the Bank's lending for industrial finance. For example, the Industrial Finance project approved by the Board in June 1983 supports the Government's ongoing program of financial sector reform. The Bank's technology enhancement objectives are being pursued through two projects approved in 1982, one for the Korea Technology Development Corporation (KTDC) which finances research, development and engineering and the other for the machinery industries which is designed to provide financial and technical assistance to raise the productivity of small and medium machinery firms. Future lending planned for industry in Korea would include continued support for the financial sector reform, for KTDC, and for the small and medium-industry subsector which is expected to play an important role in the growth of the skill-intensive industries which are crucial to the next stage of development of Korean industry.

15. Future Bank lending for agriculture is expected to be limited reflecting the completion of major infrastructure works. A planned sector loan would address a number of policy and institutional issues related to Korean agriculture which are now being defined in a sector survey. This would complement public finance issues related to farm subsidies and the restructuring of agro-industries being handled under the second SAL. Loan funds are tentatively planned to be directed to credit institutions to support long-term lending to farmers and other private entrepreneurs in the sector.

16. The Bank has played a major role in assisting the Government to modernize and expand the transport system through lending for the railroad, highway construction and improvement, and port expansion. The Highway Sector loan approved in March 1984 as well as future operations would address sectoral and subsectoral issues such as improving the integration of investment planning, energy conservation and transport efficiency related to regulation and road user charges. Those transport issues which involve macroeconomic policies affecting other sectors of the economy, such as relative fuel prices, are being handled within the context of the second SAL.

17. The Bank Group has been involved in helping to meet the requirements for skilled technical manpower, a precondition of up-market industrial diversification. The Bank's first sector loan for education, approved in 1980, was aimed at improving engineering and management education and technician training. The proposed loan would support measures designed to improve qualitative aspects of secondary and higher level science and technology education.

18. The Bank's recent lending in the urban sector involves support for three regional development projects, two low-income housing projects and two water supply projects. The Bank is assisting Korea to increase the availability of basic services such as housing, water supply, and transportation in the cities and to improve the functioning and efficiency of urban areas. New projects in urban transport, local government finance and water supply are under preparation. Continuation of the policy improvement and institution-building efforts initiated under ongoing projects is planned by moving gradually to a sector approach, first in housing.

PART III - SCIENCE AND TECHNOLOGY EDUCATION SECTOR

Introduction

19. If Korea is able to sustain rapid economic growth, by the mid-1990s it will emerge as an industrialized export-dependent economy with a rapidly declining reliance on agriculture. Production systems will become more skill- and knowledge-intensive and employ more advanced technologies. To achieve this deepening of the nation's industrial structure, science and technology will play an important role in exploiting the nation's growth potential. This larger role for science and technology within the Korean economy requires major investments in scientific and technological infrastructure and in manpower development. Government projects that: the ratio of research and development (R&D) spending to GNP will grow from about 0.7% in 1979 to 2.1% by 1991; the proportion of that investment undertaken by private industry will increase from 34% in 1979 to 60% in 1991; personnel in R&D will grow from 16,000 in 1979 to about 110,000 in 1991; and the number of scientists, engineers, technicians and craftsmen in high technology fields overall should experience a corresponding increase from 640,000 (or 4.7% of the labor force) in 1979 to 1,400,000 (or 7.6% of the labor force) in 1991.

20. In recognition of the priority of manpower development, the program for higher technical education in Korea (Loan 1800-KO approved February 19, 1980 in the amount of $100 million) addressed the need for improvement in engineering and management education and technician training. The focus of attention under the proposed loan is graduate training and research in science and engineering fields and science education at the college and secondary levels. For the sake of convenience, science education and related graduate training and research in science and engineering are called science and technology education. Science and technology education is defined as the sector in this report. Science and technology education, encompassing about 98 colleges and over 800 general high schools (GHSs), is largely under the supervision of the Ministry of Education (MOE). The Ministry of Science and Technology (MOST) is responsible for a major graduate school and research institute, the Korea Advanced Institute of Science and Technology (KAIST), other research institutes, and a research foundation, the Korea Science and Engineering Foundation (KOSEF). A large private education sector, accounting for about 75% and 45% of enrollment at the college and secondary levels respectively, complements public education. It operates under close supervision by Government, including government regulation of fees, and

effectively expands educational opportunity in both urban and rural areas without social bias. Both public and private colleges and schools charge fees with the direct cost to students of private education varying from 40 to 70% above that of public education. Over the last decade, education has expanded rapidly at all levels in Korea. Full enrollment of the primary school age group was achieved by 1975; over 80% of the corresponding secondary age group is currently in school. The share in higher education has increased sharply to about 25% in full-time studies in 1983.

21. In order to meet the expected demand for higher technical and scientific manpower, expansion of training capacity in selected fields is required, particularly at the graduate level. Given the current state of educational development in Korea, an approach that emphasizes quantity alone would be an inadequate response. New positions opening up within industry, in government research institutes, and in higher education demand advanced knowledge and skills. The quality of training required is much higher than the current, average standard in Korea particularly with respect to an experiment-oriented approach. Rather than a major expansion of training capacity, the overriding goal is qualitative improvement to be accomplished through policy and institutional change and selective investments.

Science and Technology Education at the Graduate and College Levels

22. Science and technology education at the graduate and college levels is strong in the relatively high standards already achieved in a few universities and research institutes. It is weak in: (a) the failure to apply standards of quality control and to concentrate resources, particularly for graduate education, in a few, select institutions; (b) the current low level of research activity; (c) the overall shortage of qualified faculty; and (d) the inadequate and poorly equipped facilities of many institutions.

23. Quality Control. There is wide variation in quality within the system of 98 colleges and universities (21 public, 77 private) with science or engineering programs. With the exception of undergraduate programs in engineering and in colleges of education, this diverse network of institutions is not subject to rigorous, periodic evaluation and there are no clear guidelines as to what constitutes acceptable standards. This lack of quality control among institutions leads to fragmentation of courses and failure to identify critical areas for remedial action, and adversely affects the quality and relevance of training. Since necessary conditions for graduate education can be satisfied in only a few institutions, Korea confronts a difficult challenge of strengthening selectively the system of graduate education. A long-term blueprint is required for the development of graduate education in the sciences and engineering that is at once more concentrated and specialized and that meets objective standards of quality. In science education, Government has not addressed the need for advanced training in Korea for faculty of science education departments of the colleges of education.

24. Research. Faculty research is an essential component of excellence in graduate- and college-level programs. However, research grants from all sources have averaged only $4,000 each. Limited research funds of the Ministry of Education (MOE) have been allocated on an institutional basis and

for research projects of short duration. An institution for promotion of academic research in science and technology exists in the Korea Science and Engineering Foundation (KOSEF) established in 1977 under the Ministry of Science and Technology (MOST). It funds research and scholarly publications and provides assistance for advanced training in high priority fields. Effective use of additional research funds depends upon improvement in KOSEF's management capacity.

25. With the exception of the Korea Advanced Institute of Science and Technology (KAIST), with both graduate training and research programs, the network of approximately 120 government-sponsored research institutes is isolated from the system of higher education. These institutions could provide services of teaching and research supervision for graduate students. With respect to science education research, the leading colleges of education and education research institutes, like the Korea Education Development Institute (KEDI) and the National Institute for Educational Research and Training (NIERT), have not recruited sufficient numbers of appropriately trained faculty or personnel.

26. Supply and Qualifications of Faculty. The shortage of qualified faculty adversely affects the quality of instruction. For colleges of natural science and of education the student:faculty ratio has steadily increased from 19:1 in 1970 to 28:1 in 1983. In colleges of engineering, with assistance under Loan 1800-KO, the student:faculty ratio has fallen from as high as 45:1 in 1980 to 38:1 in 1983 but remains short of the target of 21:1 set for December 1986. The typical teaching load has also risen. In 1970 46% of faculty members in science and engineering taught more than 10 hours per week; by 1983 over 60% taught in excess of 10 hours. In 1983 more than 68% of faculty were on part-time appointments. Only 50% of faculty in colleges of natural sciences possess the doctorate; of these, approximately one-half have obtained their advanced degree in traditional Korean graduate programs and stand in need of postdoctoral research training. In the science education programs of the colleges of education, less than 35% hold a doctorate; only 3% hold a doctorate in science education. Among engineering faculty members only about 35% hold a doctorate.

27. Facilities and Equipment. Expenditures on facilities and equipment have increased, but have not kept pace with increases in enrollment. MOE estimates that at the college level, laboratory facilities are only 70% of the official standard. Available equipment in science programs is only 40% of the official standard. If the gap in equipment requirements for graduate education in both sciences and engineering is included, the figure is closer to 25% of current needs. Within graduate-oriented universities, the need is also to assure the availability of research equipment carefully selected to match faculty competencies and requirements. Within the colleges of education, additional investment in teaching equipment is a prerequisite for the reorientation of instruction toward development of skills in problem solving. In all cases the shortage of facilities and adequate equipment and materials reinforces the reliance by instructors on the lecture approach and reduces the possibilities for experimental work by students.

Science Education at the Secondary Level

28. Secondary science education in Korea is comparatively strong in high student achievement on tests of scientific knowledge. It is weak in: (a) the failure to provide students opportunity to supplement this knowledge with experience in experimental procedures; (b) the absence of a system for science curriculum development based on continuous assessment and policy studies; (c) college admissions procedures that do not take sufficient account of students' achievement in school including experimental work; (d) the lack of adequate programs for staff development; and (e) the shortage of laboratory facilities and equipment in general high schools (GHSs) and regional science centers (RSCs).

29. Practical Science Activities. There is a question of balance in Korean secondary science education. Korean students perform very well on tests of scientific knowledge. In contrast they possess little opportunity to complement this knowledge with practical science skills. Results of a recent international study of achievement in science subjects suggest that, as measured against a group of developed and developing countries, Korean students performed above average and at or just below the highest standard attained in the restricted domain of scientific knowledge. At the same time, an analysis of skill development in laboratory settings places Korean children near the bottom of the list of comparator countries in terms of access to and proportion of time spent in laboratory exercises.

30. Curriculum Development and Policy Studies. Materials for high school science are produced by private publishers using authors approved by MOE and materials based on MOE guidelines. This policy is successful in that standard texts are available at reasonable cost to students throughout the country. A shortcoming is that these texts are not subjected to evaluation and revision; they are not generally supported by reference guides and manuals; and there is insufficient ongoing research, development and evaluation on which new curricula and materials can be based. An institutional base for coordination of the disparate functions of science curriculum design, materials preparation, teacher retraining, and program evaluation and feedback is also lacking.

31. College Admissions. The centrally-managed college admissions examination has been a powerful influence within secondary science education, since teachers and students give priority attention to preparation for that examination. Korea has only recently begun to adopt a more flexible system of college admissions. In 1982 a student's high school record accounted in some regions and institutions for 30% of the score on which admission is based. As recently as 1979, no weight at all was given to the high school record.

32. Training of Science Teachers. The present system of staff development for science teachers is characterized by an emphasis on content and theory rather than methodology and practical skills relevant to school situations. Although the approximately 3,600 secondary science teachers possess university degrees, they are not well-acquainted with experimental procedures and demonstration techniques. Nor are they trained in techniques of student performance assessment, including evaluation of students' experimental work.

33. Science Education Facilities and Equipment. The level of laboratory facilities is about 75% of requirements in GHSs and RSCs. Measured against the standard of proposed new courses with more laboratory-based units, availability of equipment is about 55% with an average of eight children per equipment set at one time. Under these circumstances, a sizeable proportion, possibly as high as 80% of students, would have no significant time in performing science experiments or in learning to set up and use laboratory apparatus.

Manpower Monitoring

34. Since 1980, Government has introduced changes that are tending to make the supply of high-level manpower more responsive to demand. Manpower planning has improved through a manpower analysis system under the coordination of the Inter-agency Committee for Manpower Development and Promotion chaired by the Economic Planning Board (EPB). Entrance quotas have been made more flexible and are now set at the college level, with allocation to departments determined within each college. There is need, however, for further improvement. The information base on relative supply and demand of science and technology manpower is not fully exploited and made available to decision makers. Academic institutions and students generally possess less information about career choices than could readily be made available.

Education Investment and Financing Gap

35. As part of the Fifth Five-Year Plan (FFYP) 1982-86, Government prepared a set of overall targets and a financing plan for qualitative improvement in all levels of education. The budget of MOE during the FFYP is estimated to average about 21% of the central government budget, or 4% more than the average of the Fourth Five-Year Plan. The actual level for 1982 was 20.6%; for 1983 it was 20.9%; the estimate for 1984 is 21.8%. This share corresponds with an increase in spending by MOE from an average of 3.2% of GNP in 1980 and 1981 to a projected average of 3.8% of GNP during the FFYP. In order to pay for the increased cost of education, a special education tax was introduced in 1982. The overall targets for educational development to 1986 are very ambitious by comparison with historic levels and depend heavily on the special education tax.

36. Even if public spending on education meets planned goals, a financing gap of about 15% exists for private institutions that account for about 40% of total spending on education and training in Korea. Private colleges already demonstrate lower unit costs than public institutions, yet they fulfill an important public service in satisfying the demand for education beyond that met by public institutions. Fees for private institutions account for as much as 90% of recurrent expenditure. Although the fees that private institutions are allowed to charge are considered adequate, Government should review them annually and revise them if necessary. Government should also consider introduction of student loans, greater use of tax exemptions on private donations and increased public subsidy, by means of, for example, grants for staff development and loans for laboratory equipment (para. 59).

Government Strategy and Bank Role

37. In the late 1960s and 1970s, Korea emphasized investment in industrial education with the prospect of relatively quick return as skilled labor was drawn into an expanding industrial system. In a planned transition to more skill-intensive, high technology production, Korean educational planners have adopted a longer term strategy designed to: (a) produce an appropriate number of qualified manpower in the sciences, engineering and management via a development program for higher education; and (b) strengthen the foundations of science and technology within society through improvement of science education at the secondary level.

38. Bank group lending has closely paralleled the increasing sophistication of the Korean economy. The Bank's initial involvement in the sector under four loans/credits emphasized vocational and technical education at the secondary and post-secondary level. The completion of the fourth education project in June 1983 marked the end of this phase. The Bank's current lending strategy in education, as increasingly in other sectors in Korea, calls for sector loans addressing broad policy and institutional issues. The fifth loan (Loan 1800-KO), under the program for higher technical education, was approved in 1980 with the primary objective of raising the quality of higher technical education to the standards needed for industrial development in the 1980s. This objective is being substantially realized. Government has strengthened manpower planning; it has made more flexible the procedures for student entry to academic programs within colleges of engineering; accreditation agencies have been established for three academic areas; and it has prepared a study of the financial status of private colleges of engineering and subsequently provided more than $100 million in additional public funds to these institutions. Given the rapid increase in student enrollments in 1980 and 1981, however, the student:faculty ratio in colleges of engineering has declined more slowly than originally projected. Since 1982, Government has reduced new enrollments and continued to recruit additional faculty with the result that the student:faculty ratio has declined from 50:1 in 1979 to 38:1 in 1983. However, the target data of December 1986 for reducing this ratio to 20:1, as agreed under Loan 1800-KO, is no longer realistic. Agreement has been reached with the Government under the proposed loan on a multifaceted approach to program monitoring, with annual reviews and the setting of interim targets including indicative annual enrollment levels (para. 55). Agreement has also been reached on changing the target date for achieving the 20:1 ratio to June 30, 1990 to correspond with targets under the proposed loan. Physical implementation of Loan 1800-KO is proceeding satisfactorily and on schedule with 92% of loan funds committed for approved subprojects and national programs. Ongoing Bank dialogue with Government has focussed on further policy and institutional changes that together with selected investments would promote Government's strategy for the development of science and technology education.

39. OED audit reports have been prepared for the first three education projects and concluded that projects were in general well-conceived and successfully implemented. Other points of interest are the need for: (a) advanced project preparation before approval; (b) greater focus on policy analysis and evaluation; and (c) improved local management procedures to expedite procurement. These lessons were incorporated in the design of

Loan 1800-KO and have also been incorporated in the proposed program for science and technology education.

PART IV - PROGRAM FOR SCIENCE AND TECHNOLOGY EDUCATION

40. Based on a sector survey carried out by the Bank in 1981 and 1982, the proposed program was prepared by Government with assistance of local consultants. A Bank mission appraised it in September/October 1983. Negotiations were held in Washington, D. C., from April 9-12, 1984. The Korean delegation was led by Mr. Myong-Kon Choi, Director, Economic Cooperation Division, Ministry of Finance. The Staff Appraisal Report No. 4891-KO, dated May 1, 1984, is being distributed to the Executive Directors separately and Supplementary Project Data are provided in Annex III.

Program Objectives

41. The principal objective of the program would be to bring the quality of science and technology education up to standards required for an industrial system that will be, at once, more skill- and knowledge-intensive and employ more advanced technologies. This objective translates into a strategy to: expand selectively graduate education in science and engineering and strengthen the research content of advanced training; raise average standards of college programs in science and science education; and increase the study of science subjects and introduce a more experiment-oriented science curriculum at the secondary level. The Bank has received a Policy Letter for science and technology education, submitted by the Minister of Education, with concurrence of MOST, outlining the Government's objectives and proposed Action Program (see pages 13-15) with respect to policy and institutional changes. The Action Program includes a schedule for implementing the measures proposed. The program would include expenditures on curriculum development, policy studies, research grants, development of new institutions, teacher recruitment and training, equipment and materials, and buildings.

Graduate Training and Research, and College Levels (Proposed outlay: graduate training and research, approximately $193 million; and college level, approximately $159 million, both net of contingencies).

42. Quality Control. Under the proposed program, the Government would expand the system for assessing the quality of education and establishing appropriate standards for colleges of natural science and for graduate departments in science and engineering. Under the Action Program, accreditation committees would be organized by June 30, 1985 under the Korea Council for University Education (KCUE), an independent association of the 98 colleges and universities in Korea, founded in 1982 with financial assistance of Government. Accreditation committees would on occasion include representatives of private industry. Terms of reference for the accreditation committees have been reviewed by the Bank and are satisfactory. Program quality at KAIST would be assessed by means of external review by a visiting committee. Program costs associated with accreditation include financing of foreign specialists.

Table: ACTION PROGRAM ON SECTOR POLICIES AND INSTITUTIONAL DEVELOPMENT: 1984-90

Objectives/strategies	Actions taken by April 15, 1984	Further actions to be taken
1. Graduate Training and Research: To develop graduate programs in the sector and to increase funding for, improve the management of and raise the quality of corresponding research activities.		
(a) Control quality of graduate programs in science and engineering by means of graduate program accreditation.	Government has assisted in the creation of the KCUE, an association of all colleges and universities in Korea. The Council seeks to promote quality education by conducting reviews and evaluations of higher education and recommending appropriate policies. Steps were initiated for graduate program accreditation under the aegis of the new KCUE. Program evaluation at KAIST would be conducted by an external visiting committee.	Accreditation of graduate programs in science and engineering to be initiated for sector institutions by June 30, 1985.
(b) Concentrate resources for graduate education in the sciences and in engineering in fewer institutions, with increased specialization among institutions to be reflected in the investment plan for facilities and equipment.	Government has decided to designate selected graduate-oriented universities for science and engineering fields. Guidelines and eligibility criteria for subloans and assistance under national programs for graduate schools were reviewed by Bank staff and are acceptable to the Bank.	Approximately 10 graduate-oriented universities in science and engineering are to be assisted by means of subloans for equipment and grants for faculty development. During 1984/85 Government would also prepare a long-term development plan for graduate education.
(c) Strengthen the key institution for promotion and funding of research in support of national science and technology goals.	KOSEF prepared a development plan to expand support of academic research in science and technology. KOSEF has reviewed priority fields in relation to the MOST plan for science and technology development. KOSEF prepared an investment plan for academic research support indicating proposed allocations to priority fields and also developed a plan for strengthening KOSEF management. Bank staff reviewed the investment plan and the plan for strengthening KOSEF management and found both plans reasonable.	KOSEF would allocate about 1,600 research grants with approximately 60% of funds to basic and applied science and 40% to engineering fields. At least 75% of research grants would support work of university or college-based researchers under MOE. KOSEF Program Promotion Department would increase to 10 staff by June 1985. Overall KOSEF staff would increase to about 45 by 1988.
(d) Improve collaboration among graduate schools and research institutes by cooperation in graduate teaching and in joint research.	MOST has budgeted for research collaboration with universities and with private industry. MOST has formally instructed major research institutes to appoint training coordinators from among the research personnel to organize and supervise assistance to graduate students from universities who would undertake dissertation research at research institutes. Among research institutes, KAIST, in particular, serves as a major center for university faculty development. KAIST is also conducting part-time graduate programs for approximately 400 scientists and engineers in the institutes.	KAIST would implement a plan for expansion of graduate education, especially at the Ph.D. level. Approximately 10 major research institutes would appoint training coordinators by June 30, 1985 to assist in providing research training to graduate students from universities.
(e) Develop within the network of colleges of education, a specialized center for graduate training and for research and development in science education.	The Government decided to establish the Korean National University of Teacher Education for commencement of operation in March 1985. Bank staff reviewed proposals for graduate training and research in science education. Bank staff agreed to include under subprojects allocation for graduate training in science education subject to preparation of detailed loan application.	Government would implement a development plan for the Korean National University of Teacher Education. In the first year of operation, the University would enroll about 1,500 students including about 700 at the graduate level. Of these, approximately 250 would pursue the masters or doctorate degree in science education. On completing their studies, these science education specialists would take positions as professors of science education in colleges of education or as supervisors, administrators or science education researchers in agencies of the sector.
2. College-Level Science Education: To increase the number and raise the qualifications of teaching faculty and to improve facilities and equipment in colleges of natural science and science education departments in colleges of education.		
(a) Control quality of science programs by means of a college of natural science accreditation.	See Section I (a).	See Section I (a).

Objectives/strategies	Actions taken by April 15, 1984	Further actions to be taken
(b) Increase number and upgrade qualifications of faculty members in colleges of education and colleges of natural science. Continue recruitment program for faculty of colleges of engineering.	Government has prepared faculty development and faculty recruitment plans for colleges of education, colleges of natural science and colleges of engineering. National programs for faculty development and recruitment were designed and costed. Bank staff reviewed the plans and found them reasonable.	Government would implement plans for faculty recruitment and development according to the following goals for June 30, 1990: average student: teacher ratio would fall to 20:1; average teaching load would be 10 hours per week; at least 50% of faculty would be on full-time appointments; and the proportion of faculty with the doctorate would be 65% in colleges of natural science and 50% in colleges of education and colleges of engineering. Government has agreed to interim targets for mid-term review in 1987 of: average student:teacher ratio of 25:1 in colleges of natural science and of education and 28:1 in colleges of engineering; average teaching load of 13 hours per week; at least 40% of faculty on full-time appointments; and proportion of faculty with the doctorate no less than 55% in colleges of natural science, 40% in colleges of education; and 40% in colleges of engineering.
(c) Prepare an improvement plan for facilities and equipment.	Government has prepared revised equipment lists by subject area. Equipment for college of education is primarily for science education and science teaching. An investment plan based on updated survey of requirements was reviewed by Bank staff and found reasonable. Guidelines and eligibility criteria were agreed for purposes of processing subloans.	Approximately 30 colleges of natural science and 20 colleges of education would be assisted under the program. The deficit in laboratory facilities would be reduced to about 15%. The deficit in equipment for teaching and research would be reduced to about 30% by 1990 and enable laboratory work to increase from 10% to about 30% of class time.
3. Secondary Science Education: To increase the study of science subjects, particularly at the high school level; to improve curricula and instructional materials; to strengthen the skills of classroom teachers; and to upgrade facilities and equipment of general high schools and regional science centers.		
(a) Design and implement new science curriculum with greater emphasis on experimental and practical science work and establish a management agency to oversee and coordinate overall implementation.	Government has adopted a plan to offer high school science courses on both the ordinary and the advanced levels, with science requirement for all students and prepared syllabi for new courses to be introduced in 1984. New courses would devote about 20% of instructional time in science to experimental work. Bank staff reviewed the plan for improvement of secondary science curriculum. Bank staff and Government agreed on the creation of the Science Education Development Committee (SEDC) to oversee planning and implementation of disparate functions of curriculum design, materials preparation, teacher retraining, evaluation and feedback and on staff strengthening of the Science and Vocational Education Division of GEB.	From 1984 Government would introduce a plan as follows: all students in general high schools would take four science courses on either the ordinary or advanced level; about 20% of instructional time would be devoted to experimental work. The deficit in laboratory facilities and in science equipment would be reduced to about 15% by 1990. The SEDC would commence operation by June 30, 1984 with a staff of about 10 science educators under an advisory panel of representatives of Government, the education and research sector and industry. In order to facilitate implementation, the Science and Vocational Education Division of GEB would increase to 15 by June 30, 1984.
(b) Introduce systematic monitoring of secondary science education for policy analysis.	Government and the Bank have agreed on two areas that require further study. These are the need for: national surveys to evaluate student performance for policy guidance; and improvement of assessment skills by teachers.	Government would introduce, by June 30, 1985, a plan for monitoring the secondary science program and a plan for improving teachers' assessment skills.
(c) Adjust college admissions procedures to enable individual colleges to select students by taking account of students' overall performance on the entrance examination, as well as achievement on the science and mathematics component of the entrance examination and on the school record.	Since 1981 college admission procedures have taken into account the school record and the school record includes a grade for experimental and practical work. In most cases, however, only a total score is made available to colleges and decisions on admission to programs in science or engineering are made without detailed information on student prior achievement in science and mathematics. The effects of the changes to date are insufficient as an incentive for schools, teachers and students to place more emphasis on science. The school record and the science record component are not systematically shared with colleges selecting students.	Government would evaluate the admissions examination system and develop a modified approach with a view to providing selecting colleges the students' scores in mathematics and science as well as the students' school record. Findings of the study would be implemented in the admissions cycle for the 1987 academic year.
(d) Design and implement staff development programs for secondary science teachers, laboratory assistants and science education specialists in regional science centers, and central agencies of MOE.	MOE prepared a national program for retraining and upgrading secondary science teachers and specialists including overseas training in fields not currently offered in colleges in Korea. Bank staff reviewed the national program and found it reasonable.	Government would recruit approximately 700 additional science teachers per year from 1984-88 and also attain a level of 2 laboratory assistants per general high school by June 30, 1990.

Objectives/strategies	Actions taken by April 15, 1984	Further actions to be taken
4. Science and Technology Education Sector Planning and Finance.		
(a) Improved manpower monitoring for science and technology sector.	EPB chairs a manpower promotion committee with authority to coordinate manpower planning, to formulate and commission special studies. Government regularly updates manpower projections as well as relevant labor market information, using resources of MOST, Ministry of Labor, MOE, EPB and consultants in Korea Development Institute and KEDI.	MOE would regularly provide results of manpower studies to universities and also assist each institution to improve services of student career counselling.
(b) Projected enrollment in undergraduate and graduate programs in science and engineering should not exceed economically justifiable level or increase at such a pace as to prejudice goal of improving quality.	MOE and MOST have prepared enrollment and output forecasts through 1990 in science and engineering programs as indicative annual enrollment levels. Bank staff reviewed enrollment and output in relation to investment plan and various estimates of demand prepared by MOST. On the graduate level there is an approximate balance. On the undergraduate level, projected output in engineering may exceed the forecast of economic demand. This is due to high social demand, rapid expansion of enrollment in the period 1980-82 and Government decisions to promote training of science and technology manpower.	Government would monitor enrollments in terms of labor market demand as well as indicators of program quality as in 2 (b). Government would also use agreed annual enrollment levels as a guideline for planning. For colleges of engineering, in particular, the interim target for 1987 is 140,000 students; the guideline figure for 1990 is 160,000 students.
(c) Based on a sector survey carried out jointly by Government and the Bank in 1981 and 1982, several adjustments were recommended in education plans. Overall spending on education should be adjusted in accordance with economic performance and annual budgetary policy. In order to diminish impact on recurrent expenditure of proposals in Fifth Five-Year Plan (FFYP) to reduce class size, raise teachers' salaries and implement compulsory middle school education, Government should phase implementation over a ten-year as opposed to a five-year period.	Government agreed that original policies to reduce class size and achieve universal publicly funded middle school education would be achieved by 1991 rather than by 1986 as was initially proposed. Government also prepared a revised analysis of projected educational expenditure and finance in Korea. Bank staff reviewed the information and concluded that the overall trend is consistent with targets under the FFYP including revenue from the education tax. Expenditure by MOE will not exceed 22% of national budget or 4.1% of GNP during the FFYP and should decline marginally to 1991. In 1982, total public expenditure on education and training reached approximately 6% of GNP, and total private finance of education and training was about 3.9% of GNP. These levels are reasonable.	No further action required.
(d) Korea has developed a large privately funded education system that fulfills a valuable educational role at both the secondary and higher levels. It operates under close supervision of Government, including Government regulation of fees, and provides educational services in both urban and rural areas. It effectively expands educational opportunity without social bias. However, private schools and colleges require financial assistance for improvement of science and technology education. Private graduate schools, in particular, require additional financial assistance for expansion and improvement of graduate programs.	Government recognizes that private educational institutions provide valuable public service and reduce the share of educational finance borne by Government. It is in the public interest to preserve their financial base and to assist their achieving quality objectives. Bank staff reviewed the level of fees in both public and private institutions and judged them as adequate and reasonable. Government agreed to review fees annually and, if necessary, increase them.	Government would provide assistance to private institutions under subprojects and national programs. Government would also prepare each year during the program a financial plan for private graduate schools, colleges and high schools to ensure the enhancement of their quality in accordance with the objectives of the program, and in consultation with the Bank, on the occasion of each annual and the mid-term review, proceed to implement this plan.

43. Concentration of Graduate Education. A major objective of the program is to concentrate resources for graduate education in a few graduate-oriented universities. This would be achieved as follows: (a) under the guidelines for allocation of loan proceeds, no more than 15 subprojects for science or engineering graduate programs would be financed with the result that 10, and quite possibly fewer, individual graduate-oriented universities would receive program funds; (b) the allocation of KOSEF research grants under competitive procedures would result in increased resources for the relatively stronger graduate-oriented institutions that are able to formulate high quality research proposals; and (c) Government would undertake in 1984-85 a study of the future development of graduate education in science and technology. Terms of reference for this study have been reviewed by the Bank and are acceptable. Program costs would include facilities and equipment for graduate-oriented institutions, including KAIST, assistance for faculty recruitment and development, short-term specialists to advise on graduate programs, and the study on graduate education in science and technology.

44. Research Promotion and Funding. Under the program, the Government would expand the operations of KOSEF and strengthen its capacity to manage a larger research program directed at 15 priority fields identified by KOSEF planners as critical for long-term economic and industrial development. KOSEF budget would grow from about $6.0 million in 1983 to $24.0 million in 1988 in 1983 prices and finance about 1,600 research projects over that period. Loan assistance would represent a decreasing share of the total KOSEF program or from about 25% in 1984 to 10% in 1988.

45. Collaboration between Graduate Schools and Research Institutes. Under the Action Program graduate and post-doctoral study and research at KAIST would be financed from existing scholarship funds for master's and doctoral graduates from Korean universities and for university faculty; the approximately 10 major research institutes would each designate by June 30, 1985, a training coordinator for supervision of research training of graduate students assigned by the universities; members of research institutes would serve as adjunct professors in university-based graduate programs to enrich courses and improve research performance; and KOSEF would encourage researchers based in universities and research institutes to prepare joint research proposals.

46. Graduate Education and Research in Science Education. In order to strengthen graduate training and research in science education, Government would establish a new college of education, Korean National University of Teacher Education, as a center of excellence for training high-level manpower for teacher education and for research in science education. Subproject application and appraisal report for the Korean National University of Teacher Education have been reviewed by the Bank and found satisfactory.

47. Faculty Recruitment and Development. Under the program, the supply of teaching staff would grow from about 6,000 to 14,000 faculty members. The

expansion of teaching staff would be achieved by: (a) increasing output from local graduate programs; (b) recruiting Korean graduate students on completion of their training abroad; (c) providing special incentives, including travel and housing benefits and an initial research fund, for repatriation of Korean scientists and engineers working abroad; and (d) inviting adjunct professors from research institutes or industry to offer special courses, to direct graduate research and to assist in curriculum planning. Repatriation of Korean scientists and engineers abroad is part of a quite successful ongoing initiative of Government and would be continued after the program with government financing. At the projected level of faculty recruitment, by June 30, 1990 the average teaching load for full-time faculty would be about 10 hours per week and the proportion of faculty on full-time appointments would average 50%. To improve incentives, Government has chosen to increase average salaries for teachers in public institutions in the period 1984-86 at a rate approximately 2% p.a. above general civil service salary increases. The share of scholarship funds devoted to graduate education would increase from 7.5% of all funds for scholarships for higher education to 15% by 1986. The qualifications of existing faculty members would also be improved under the program. By 1990, 65% of faculty in science and 50% in science education and engineering would hold the doctorate. Upgrading of current faculty would be accomplished by strengthening and expanding local graduate programs; providing overseas fellowships for training and research opportunities abroad; and organizing workshops and seminars. Fellowships would be awarded in accordance with selection criteria and procedures acceptable to the Bank (Section 3.07 of the draft Loan Agreement).

48. Facilities and Equipment. The program aims at increasing laboratory facilities to 85% and equipment provisions to about 70% of the official standard in science, science education, and graduate engineering. The proposed investment in facilities and equipment for colleges of natural science and colleges of education under the program would enable colleges to increase laboratory work in science and science education from about 10% to about 30% of class time.

Secondary Level Science Education (Proposed outlay, approximately $191 million, net of contingencies).

49. Science Curriculum. In order to improve the effectiveness of science education within GHSs, the Government would offer high school science courses on two levels, ordinary and advanced, with requirements in each of biology, chemistry, earth science and physics for all students. About 140 experimental units would be introduced in the courses with the result that approximately 20% of instructional time would be devoted to experimental work. This plan would be implemented progressively from 1984 and reach full scale within the approximately 800 GHSs by 1988. It would use as supporting infrastructure 13 RSCs in the nine provinces and four principal cities.

50. Science Education Development Committee. Government would establish by mid-1984 a Science Education Development Committee (SEDC) to oversee planning and implementation of the secondary science program, particularly curriculum and materials development, staff development and procedures for program monitoring and evaluation.

51. Program Evaluation. To support regular review and updating of policies for secondary science education, performance monitoring and evaluation would be introduced under the Action Program by June 30, 1985. The monitoring system would be coordinated by SEDC and the work carried out under contract by specialists in the colleges of education, KEDI, NIERT or by private consultants. MOE is also preparing a plan for improving, by means of in-service training, the skills of secondary level science teachers in assessing student achievement, particularly in their experimental work. Under the Action Program, the plan would be implemented by June 30, 1985 via in-service training programs of the colleges of education and RSCs. Terms of reference for the plan for program monitoring and the plan for improving teachers' assessment skills have been reviewed by the Bank and are satisfactory.

52. College Admissions Procedures. A study on the college admissions procedures would examine measures to improve the college entrance examination system as a tool for both student selection and reinforcement of secondary science curriculum goals. Terms of reference for this study have been reviewed by the Bank and are acceptable. The study would commence September 1984. The findings of the study would be implemented in the admissions cycle for the 1987 academic year.

53. Recruitment and Staff Development. Introduction and management of the new science courses in GHSs require recruitment of additional science teachers and laboratory assistants. MOE has a plan for increasing recruitment from about 350 science teachers per year to approximately 700 teachers per year betweem 1984 and 1988 from among the 5,000 graduates annually of the colleges of education and colleges of natural science qualified for secondary school science teaching. MOE also plans to recruit an additional 1,300 laboratory assistants by June 30, 1990 from among the ample supply of graduates of the junior technical or teacher training colleges in order to raise the average of laboratory assistants from less than one to two per GHS. Staff would also participate in both local and overseas training in curriculum development, evaluation techniques, and equipment maintenance and operation. Fellowships would be awarded in accordance with selection criteria and procedures acceptable to the Bank (Section 3.07 of the draft Loan Agreement).

54. Facilities and Equipment. The deficit in laboratory facilities would be reduced to 15% by 1990 with finance provided from the special education tax or from private sources. The overall deficit in required science equipment would be narrowed to about 15% by provision of equipment to each of the 800 GHSs. Each of the RSCs would receive from the program equipment for the experimental units in the new high school science courses, for enrichment and teacher training, and for maintenance and repair.

Sector Planning

55. In order to make the science and technology education sector more responsive to economic factors, Government would report more systematically on manpower and placement services, including liaison with private industry, to colleges and universities, seek to improve student guidance services and monitor closely enrollment in relation to program objectives of qualitative improvement. The planned investment in training scientists and engineers

throughout the 1980s should satisfy in quantitative terms the anticipated expansion of employment in related occupations. Government recognizes, however, the tradeoff between quantitative expansion in numbers of scientists and engineers trained and key objectives of improving the average quality of higher education in science and technology. On the basis of experience gained under Loan 1800-KO, the Bank and Government have agreed to adopt a multi-faceted approach in monitoring the progress in implementing the sector program. Indicators and criteria for monitoring the program would include: (i) student:teacher ratio; (ii) proportion of faculty with Ph.D.; (iii) proportion of full-time faculty; (iv) average teaching load per week; and (v) indicative annual enrollment levels. Other factors affecting college enrollments such as aggregate size and employment prospects of high school graduating classes, junior college system development and fees structure would also be carefully analyzed. These performance indicators and criteria would be analyzed during each annual review to be held between the Government and the Bank during which agreement would be reached on the targets to be monitored in the following year (para. 57).

Management and Implementation

56. Management. The program for science and technology education would build upon and expand the program for higher technical education assisted under Loan 1800-KO. The proposed program would be composed of national programs (approximately five) and subprojects (about 60). National programs represent actions that would potentially benefit the entire sector or subsectors and include: the program of research grants under KOSEF; accreditation assistance; staff development programs via overseas and local training, and repatriation of Korean scientists and engineers abroad; equipment for approximately 800 GHSs and 13 RSCs; and studies. Subprojects, in contrast, would be tailored to meet the needs, particularly for equipment, of graduate schools and colleges that apply under the program. Subprojects from about 10 graduate schools of science and engineering, 30 colleges of natural science and 20 colleges of education are expected to be supported under the proposed loan. Each national program and subproject would be processed by the Government in accordance with guidelines and criteria agreed with the Bank (Sections 3.05 and 3.06 of the draft Loan Agreement). MOE would appraise and approve national programs and subprojects for institutions under its jurisdiction. MOST would supervise the national program of research grants managed by KOSEF and the KAIST subproject. Implementation of the program would be carried out within the existing organizational set-up of MOE and MOST. This approach would be the most efficient way to execute the development program for science and technology education. It is also a desirable way of further institutionalizing program management capacity in government agencies.

57. Implementation. Under Loan 1800-KO the Government used procedures acceptable to the Bank for equipment procurement and technical assistance management. These same procedures would be used for the proposed sector loan. Implementation procedures would also incorporate several improvements designed to accelerate implementation, including appointment of technical review committees and processing of subprojects well in advance of the effective date of the loan. Four representative subloan applications and appraisal reports were reviewed at negotiations as a sample check. The quality and

standards of preparation and appraisal were found to be acceptable to the Bank. The Bank would only exercise ex post review of additional subprojects on a sample basis during review missions. Under MOE, corresponding division directors would be responsible for monitoring the progress of national programs and subprojects. Up-to-date information would be collected and semi-annual evaluation reports prepared. These reports would form the basis for comprehensive annual reviews with the Bank, during which targets for the following year would be set. The Bank and the Government have agreed: (a) on key performance indicators, and first year and mid-term targets, including indicative annual enrollment levels; and (b) that the annual comprehensive review would take place by October 31 annually, and a mid-term review of the program, by October 31, 1987 (Section 3.08 of the draft Loan Agreement). The timing for the mid-term review is linked to full implementation of the Action Program, expected in 1990. The Government's total investment program in science and technology education would be implemented over the six years from January 1984 to December 1989. The schedule of implementation for the entire program is realistic. All MOE subproject applications are expected to be prepared, appraised and tentatively approved by the Minister before loan signing and procurement of subproject equipment through the Office of Supply Republic of Korea (OSROK) would proceed soon after loan signing. KOSEF national program and KAIST subproject are likewise at an advanced stage of preparation. All subprojects and national programs funded by the Bank would be completed by June 30, 1988.

Cost and Financing

58. Costs are defined as the investment program for the science and technology education sector for July 1984 to June 1988, of which the proposed loan would finance a time slice. The level of the investment program is appropriate to effect the proposed policy and institutional changes and qualitative improvement in the sector. The investment program is economical and would be financially feasible. The investment program for public and private science and technology education is costed at $542 million net of contingencies and $695 million with contingencies. The allocation of investment between components shows that graduate education and research would receive $193 million; college level $159 million; and secondary level $191 million, net of contingencies. The public share of the investment program is estimated at $391 million net of contingencies. The investment program for private institutions is estimated at $152 million net of contingencies. Base costs refer to April 1984 prices. Civil works are estimated on the basis of EPB's standards for building unit costs and are reasonable; equipment costs are based on the estimated cost of research equipment at the graduate level and on standard equipment lists for the college and secondary level updated in 1983 and are reasonable. The technical assistance component would include 116 man-months of specialist services; 16,260 man-months of overseas fellowships; and repatriation for 120 scholars. The man-month cost of overseas fellowships is expected to average about $1,500 and the cost of each repatriation about $25,000. About five policy studies and 1,600 KOSEF research grants would be included in the sector program. The costs of each policy study and of each KOSEF research grant are expected to average $140,000 and $25,000, respectively. Physical contingencies represent 10% and price contingencies about 18% of the base cost. Price contingencies are calculated on base costs plus physical

contingencies and estimated on the basis of the implementation schedule and expected annual increases in prices of 3.5% in 1984, 8.0% in 1985 and 9.0% from 1986 to 1988 in both local and foreign costs. Foreign exchange costs are estimated at 20% for civil works; 90% for equipment; 90% for specialist services; 100% for overseas training; 100% for repatriation; 50% for studies; and 60% for research grants. The foreign exchange cost of the total investment program is $349 million or 50% of total cost. The estimated investment program includes duties and taxes amounting to about $21 million (about 3% of total program cost). The Government and private institutions would finance such costs. Imported instructional equipment and foreign specialists' services are exempted from taxes. The Government would undertake 62% of the investment program and private sources 24% (both including all the costs of civil works). The proposed Bank loan of $100 million equivalent (including front-end fee of $0.2 million) would cover 14% of the total investment program. The loan would represent 29% of the estimated foreign exchange component.

59. Recurrent Cost. The additional recurrent expenditures generated by the investment program are within the financial capacity of Government and the private institutions. For the public sector these additional expenditures would average about 1.0% of the annual budgets of MOE and MOST between 1984 and 1988. For private institutions total additional recurrent expenditures would average about $40 million or about 10% of their 1983 annual expenditure. Under the Action Program, the Government would review student fees annually and authorize adjustments if necessary. Growth in income from endowments, direct grants from private sources and Government, as well as other public subsidies, would also be utilized to meet the recurrent costs of private institutions. The increase in fellowships and scholarships would assist students in meeting tuition and related costs and broaden access to higher education.

60. Financing of Private Institutions. Assistance for private colleges and graduate schools under subprojects would be financed through subloans by the Government to the private institutions. Private institutions would receive subloans on terms and conditions satisfactory to the Bank (Section 3.05 of the draft Loan Agreement). It is expected that the terms of the subloans would be the same as those of the Bank loan. As an added incentive to private institutions, the Government has agreed to prepare each year during the program a financial plan for private graduate schools, colleges and high schools to ensure the enhancement of their quality in accordance with the objectives of the program, and in consultation with the Bank, on the occasion of each annual and mid-term review, proceed to implement this plan (Section 3.08(b) of the draft Loan Agreement). Assistance for private institutions under national programs would be part of the financial plan and is expected to be on a grant basis.

Procurement

61. Procurement arrangements under the proposed program are summarized in the table below. Civil works, none of which is financed by the Bank, would be procured through established local procedures. The proposed loan would finance about $74 million equivalent of equipment, books and materials. In continuation of the threshold applicable under Loan 1800-KO, equipment packages of $500,000 equivalent or more would be awarded on the basis of international competitive bidding in accordance with Bank guidelines. Equipment

items which cannot be grouped to form bid packages of $500,000 equivalent or more would be awarded on the basis of local competitive bidding, under government procurement procedures acceptable to the Bank, subject to an aggregate total value not exceeding $11 million equivalent (about 15% of the total value of equipment financed under the loan). Miscellaneous equipment items in packages each not exceeding $50,000 equivalent, and in aggregate $700,000 equivalent (or 1% of the estimated value of equipment financed under the loan) could be procured through direct purchase on the basis of at least three price quotations. Local manufacturers are expected to bid, especially on equipment for the secondary level, and would be extended a 15% preference margin, or the prevailing custom duties, whichever is lower, in bid evaluations. Instructional materials and books would be procured through direct purchase after negotiation for discounts. All consultants would be selected in accordance with principles and procedures satisfactory to the Bank on the basis of the Bank's guidelines for the use of consultants. Contracts for studies would be approved and awarded by MOE; contracts under KOSEF research grants would be approved and awarded by KOSEF. These contracts would be reviewed on a sample basis by visiting Bank missions.

PROCUREMENT PROFILE /a
($ million)

Category of expenditure	Procurement Method				Total cost
	ICB	LCB	Other	N. A.	
Civil works	-	280.9 (0.0)	-	-	280.9 (0.0)
Equipment and instructional materials	201.7 (61.8)	37.8 (11.0)	12.6 (0.9)	-	252.1 (73.7)
Local training	-	-	-	73.9 (0.0)	73.9 (0.0)
Overseas fellowships	-	-	-	31.5 (8.3)	31.5 (8.3)
Overseas recruitment	-	-	-	3.9 (3.9)	3.9 (3.9)
Specialist services	-	-	-	1.4 (1.4)	1.4 (1.4)
Studies	-	-	-	0.9 (0.9)	0.9 (0.9)
Research grants	-	-		50.5 (11.6)	50.5 (11.6)
Total	201.7 (61.8)	318.7 (11.0)	12.6 (0.9)	162.1 (26.1)	695.1 (99.8)

/a Figures in parentheses are the respective amounts financed by the Bank.

62. OSROK was not required to refer to the Bank for prior review of the estimated 6,000 contracts for equipment or technical assistance under Loan 1800-KO, but rather retained bid evaluation reports, documents and contracts for selective ex post review by Bank staff during missions. This procedure, which worked to the Bank's satisfaction as confirmed by regular sample review of documentation, would be continued under the proposed program. Based on an analysis of the profile of contracts under Loan 1800-KO, Bank field review of about 3% of contracts (about 150 contracts above US$100,000 each) would cover about 40% of the total value of all contracts (estimated to number about 5,500).

Disbursements

63. The proposed sector loan of $100 million would be disbursed on the basis of: (a) 100% of the foreign expenditures of imported equipment including books and materials, or the ex-factory cost of locally manufactured equipment; (b) 65% of the cost of other local expenditures for equipment; (c) 100% of the expenditures for specialist services, overseas fellowships, studies and repatriation of Korean scholars from abroad; and (d) 60% of the expenditures for research grants. The minimum size for withdrawal applications would be $100,000. The proposed program would be implemented over a four-year period commencing from July 1, 1984. The completion date would be June 30, 1988 and the closing date June 30, 1989.

64. In reference to documentation of disbursement applications, for contracts exceeding $100,000, two copies would be submitted to the Bank. For the large number of contracts below $100,000, statements of expenditure (SOE) would be used. In this case contracts and supporting documents would be retained in one location each for KOSEF and MOE, and made available for review by visiting Bank missions. Disbursements against SOEs would be made on the basis of a consolidated summary, each not less than $100,000. Disbursements against other program expenditures would be made against full documentation. Under the proposed loan, special accounts would be set up for the disbursement of KOSEF research grants, for KAIST and for MOE. The accounts would be set up and maintained in US dollars at the Korea Exchange Bank in Seoul, Korea. For each special account, applications for replenishment would be submitted quarterly, or more frequently if necessary, with SOEs as supporting documentation. The opening of the special accounts is a condition for disbursement under each of their respective categories (Paragaph 4 of Schedule 1 to the draft Loan Agreement).

Accounts and Audits

65. Government would establish and maintain separate accounts to record expenditures out of Bank loan proceeds. Auditing of accounts, including documentation of SOEs, would be performed by an independent auditor satisfactory to the Bank. Annual audit reports would be sent to the Bank within six months of the end of the Government's fiscal year (Section 4.02 of the draft Loan Agreement). The Bank is satisfied with present auditing standards in Korea. Six months after the closing date Government would submit a project completion report to the Bank.

Benefits and Risks

66. The proposed sector program represents a new approach to improving science and technology education, as one element of a broad effort to raise the technological level of industry. It focuses on government action with respect to sector policies and institutions that together hold far-reaching change in the management and performance of science and technology education. These adjustments would improve sector management through actions to set academic standards, concentrate resources for graduate education, increase research activity in priority fields, and strengthen sector planning and program evaluation. They would improve sector performance through actions to increase the supply and qualifications of teaching staff, improve facilities and equipment and increase resources devoted to practical and laboratory-based educational activities. At the graduate and college levels, by 1990 student:faculty ratios would average 20:1; average teaching load would be approximately 10 hours per week; about 50% of all faculty would be on full-time appointments; and the proportion of faculty holding the doctorate would reach 65% in science and 50% in science education and in engineering. The shortage of laboratory facilities would be reduced to 15% of the official standard. The deficit in equipment for research and teaching would be reduced to an average of 30% of the official standard. At the secondary level, all students in GHSs would study four science subjects; 140 experimental units would be introduced in these courses; about 20% of instructional time in science would be devoted to experimental science; and the overall deficit in laboratory facilities and science equipment would be narrowed to about 15% each. By 1990 the science and technology education sector would graduate approximately 7,000 students per year at the graduate level in science or engineering; 18,000 students at the college level in science or science education; and 400,000 students per year from GHSs with an improved science curriculum. As a result of this program these graduates would be of higher quality and in fields of evident national priority.

67. While providing substantial benefits, this program comprises manifold changes. It would be complex to execute and would impose a significant management burden on Government. Due to the significance, complexity and management load of this program, there is a risk that delays may occur. However, features of program design and lessons from the program for higher technical education (Loan 1800-KO) incorporated into this program reduce this risk significantly. First, the main agencies involved participated extensively in the sector survey in 1981 and 1982 and in the identification and preparation of the program including revised policies, institutional changes, and guidelines and criteria for approval of national programs and subprojects. Second, the management system and operating procedures have been designed to allow for adjustment during implementation by mutual agreement of Government and the Bank following annual joint and mid-term reviews. Third, the schedule for subproject processing and equipment procurement has been significantly advanced by comparison with the previous sector program. In sum, Government's familiarity with the content of the program, its commitment to the objectives, the flexibility of program design, and the borrower's experience and competence combine to reduce risk of delays to acceptable levels.

PART V - LEGAL INSTRUMENTS AND AUTHORITY

68. The draft Loan Agreement between the Republic of Korea and the Bank, and the Report of the Committee provided for in Article III, Section 4 (iii) of the Articles of Agreement of the Bank are being distributed separately to the Executive Directors. Special Conditions of the project are listed in Section III of Annex III. Conditions of disbursements include the opening of three special accounts at the Korea Exchange Bank by the Ministry of Education, Korea Advanced Institute of Science and Technology and the Korea Science and Engineering Foundation.

69. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Bank.

PART VI - RECOMMENDATIONS

70. I recommend that the Executive Directors approve the proposed loan.

A.W. Clausen
President
by: Ernest Stern

Attachments
May 2, 1984
Washington, D.C.

KOREA, REPUBLIC OF - SOCIAL INDICATORS DATA SHEET

	KOREA, REPUBLIC OF			REFERENCE GROUPS (WEIGHTED AVERAGES) /a	
				(MOST RECENT ESTIMATE) /b	
	1960/b	1970/b	MOST RECENT ESTIMATE/b	MIDDLE INCOME ASIA & PACIFIC	MIDDLE INCOME LAT. AMERICA & CARIB
AREA (THOUSAND SQ. KM)					
TOTAL	98.5	98.5	98.5	.	.
AGRICULTURAL	21.4	23.2	22.4	.	.
GNP PER CAPITA (US$)	180.0	420.0	1700.0	1028.6	2088.2
ENERGY CONSUMPTION PER CAPITA					
(KILOGRAMS OF COAL EQUIVALENT)	208.0	723.0	1563.0	792.8	1407.6
POPULATION AND VITAL STATISTICS					
POPULATION,MID-YEAR (THOUSANDS)	25012.0	32241.0	38880.0	.	.
URBAN POPULATION (% OF TOTAL)	27.7	40.7	55.9	32.9	65.9
POPULATION PROJECTIONS					
POPULATION IN YEAR 2000 (MILL)			52.2	.	.
STATIONARY POPULATION (MILL)			73.8	.	.
YEAR STATIONARY POP. REACHED			2095	.	.
POPULATION DENSITY					
PER SQ. KM.	254.0	327.4	387.9	260.7	35.6
PER SQ. KM. AGRI. LAND	1168.8	1387.3	1702.2	1696.5	93.2
POPULATION AGE STRUCTURE (%)					
0-14 YRS	42.9	42.1	33.7	39.4	40.1
15-64 YRS	53.7	54.6	62.3	57.2	55.8
65 AND ABOVE	3.3	3.3	4.0	3.3	4.1
POPULATION GROWTH RATE (%)					
TOTAL	2.1	2.5	1.7	2.3	2.3
URBAN	4.7	6.4	4.6	3.9	3.7
CRUDE BIRTH RATE (PER THOUS)	42.7	30.3	24.0	31.3	31.5
CRUDE DEATH RATE (PER THOUS)	13.4	9.1	6.9	9.6	8.1
GROSS REPRODUCTION RATE	2.7	2.1	1.4	2.0	2.0
FAMILY PLANNING					
ACCEPTORS, ANNUAL (THOUS)	..	671.0	686.0/c	.	.
USERS (% OF MARRIED WOMEN)	..	32.0	55.0	46.6	..
FOOD AND NUTRITION					
INDEX OF FOOD PROD. PER CAPITA (1969-71=100)	89.0	99.0	124.0	125.2	113.0
PER CAPITA SUPPLY OF					
CALORIES (% OF REQUIREMENTS)	97.0	107.0	128.0	114.2	111.3
PROTEINS (GRAMS PER DAY)	57.0	63.0	82.0	57.9	67.9
OF WHICH ANIMAL AND PULSE	7.0	8.0	14.0/d	14.1	34.1
CHILD (AGES 1-4) DEATH RATE	8.6	4.0	2.0	7.6	5.3
HEALTH					
LIFE EXPECT. AT BIRTH (YEARS)	54.4	60.3	66.1	60.2	64.6
INFANT MORT. RATE (PER THOUS)	78.3	50.1	33.1	68.1	62.6
ACCESS TO SAFE WATER (%POP)					
TOTAL	12.1	58.0	71.0	37.1	64.8
URBAN	18.6	84.0	85.0	54.8	77.8
RURAL	9.5	38.0	54.9	26.4	44.3
ACCESS TO EXCRETA DISPOSAL (% OF POPULATION)					
TOTAL	..	25.0	64.0/e	41.4	54.6
URBAN	..	59.0	80.0/e	47.5	69.8
RURAL	..	..	50.0/e	33.4	29.8
POPULATION PER PHYSICIAN	3540.0	2240.0	1690.0	7771.9	1776.0
POP. PER NURSING PERSON	3250.0/f,h	1790.0/h	380.0	2462.6	1012.2
POP. PER HOSPITAL BED					
TOTAL	2510.0	1950.0	640.0/g	1047.2	477.0
URBAN	1290.0/f	1100.0	750.0/g	651.1	667.5
RURAL	..	..	..	2591.9	1921.6
ADMISSIONS PER HOSPITAL BED	..	14.9	..	27.0	27.2
HOUSING					
AVERAGE SIZE OF HOUSEHOLD					
TOTAL	5.6	5.0	4.5	..	..
URBAN	5.4	..	..	..	..
RURAL	5.6	..	..	..	..
AVERAGE NO. OF PERSONS/ROOM					
TOTAL	2.5	2.3	2.0/e	..	..
URBAN	2.8	2.7	2.1/e	..	..
RURAL	2.4	2.2	2.0/e	..	..
ACCESS TO ELECT. (% OF DWELLINGS)					
TOTAL	28.4	49.9	..	..	..
URBAN	67.3	92.4	..	..	..
RURAL	12.4	29.9	64.9/d	..	..

KOREA, REPUBLIC OF - SOCIAL INDICATORS DATA SHEET

	KOREA, REPUBLIC OF			REFERENCE GROUPS (WEIGHTED AVERAGES) /a (MOST RECENT ESTIMATE) /b	
	1960 /b	1970 /b	MOST RECENT ESTIMATE /b	MIDDLE INCOME ASIA & PACIFIC	MIDDLE INCOME LAT. AMERICA & CARIB
EDUCATION					
ADJUSTED ENROLLMENT RATIOS					
PRIMARY: TOTAL	94.0	103.0	107.0	101.2	105.0
MALE	99.0	104.0	108.0	106.0	106.3
FEMALE	89.0	103.0	105.0	97.5	103.6
SECONDARY: TOTAL	27.0	42.0	85.0	44.9	40.0
MALE	38.0	50.0	89.0	50.0	38.6
FEMALE	14.0	32.0	80.0	44.6	41.2
VOCATIONAL (% OF SECONDARY)	14.2	14.3	18.6	18.5	34.0
PUPIL-TEACHER RATIO					
PRIMARY	58.0	57.0	46.0	32.7	30.7
SECONDARY	34.0	37.0	39.0	23.4	16.7
ADULT LITERACY RATE (%)	70.6	87.6	93.0/i	72.9	79.5
CONSUMPTION					
PASSENGER CARS/THOUSAND POP	0.5	1.9	6.2	9.7	45.6
RADIO RECEIVERS/THOUSAND POP	31.2	124.4	392.7	113.7	228.2
TV RECEIVERS/THOUSAND POP	0.3	13.0	164.4	50.1	108.3
NEWSPAPER ("DAILY GENERAL INTEREST") CIRCULATION PER THOUSAND POPULATION	68.1	136.3	172.8	54.0	64.1
CINEMA ANNUAL ATTENDANCE/CAPITA	4.1	5.2	1.7	3.4	2.9
LABOR FORCE					
TOTAL LABOR FORCE (THOUS)	8307.0	11285.0	15064.0	.	.
FEMALE (PERCENT)	26.1	32.7	32.5	33.6	24.8
AGRICULTURE (PERCENT)	66.0	50.0	34.0	50.9	31.3
INDUSTRY (PERCENT)	9.0	17.0	29.0	19.2	23.9
PARTICIPATION RATE (PERCENT)					
TOTAL	33.2	35.0	38.7	38.6	31.3
MALE	49.5	46.8	51.9	50.7	49.8
FEMALE	17.2	23.0	25.4	26.6	14.8
ECONOMIC DEPENDENCY RATIO	1.4	1.3	1.0	1.1	1.4
INCOME DISTRIBUTION					
PERCENT OF PRIVATE INCOME RECEIVED BY					
HIGHEST 5% OF HOUSEHOLDS	..	17.1	16.1/g	22.2	..
HIGHEST 20% OF HOUSEHOLDS	..	44.5	45.3/g	48.0	..
LOWEST 20% OF HOUSEHOLDS	..	7.1	5.7/g	6.4	..
LOWEST 40% OF HOUSEHOLDS	..	17.7	16.9/g	15.5	..
POVERTY TARGET GROUPS					
ESTIMATED ABSOLUTE POVERTY INCOME LEVEL (US$ PER CAPITA)					
URBAN	..	..	320.0/i	194.5	289.8
RURAL	..	..	270.0/i	155.0	184.5
ESTIMATED RELATIVE POVERTY INCOME LEVEL (US$ PER CAPITA)					
URBAN	..	..	370.0/i	178.0	519.8
RURAL	..	..	310.0/i	164.8	372.1
ESTIMATED POP. BELOW ABSOLUTE POVERTY INCOME LEVEL (%)					
URBAN	..	..	18.0/i	24.4	..
RURAL	..	..	11.0/i	41.1	..

.. NOT AVAILABLE
. NOT APPLICABLE

N O T E S

/a The group averages for each indicator are population-weighted arithmetic means. Coverage of countries among the indicators depends on availability of data and is not uniform.

/b Unless otherwise noted, "Data for 1960" refer to any year between 1959 and 1961; "Data for 1970" between 1969 and 1971; and data for "Most Recent Estimate" between 1979 and 1981.

/c 1975; /d 1977; /e 1975; /f 1962; /g 1976; /h Registered, not all practicing in the country; /i 1978.

DEFINITIONS OF SOCIAL INDICATORS

Notes: Although the data are drawn from sources generally judged the most authoritative and reliable, it should also be noted that they may not be internationally comparable because of the lack of standardized definitions and concepts used by different countries in collecting the data. The data are, nonetheless, useful to describe orders of magnitude, indicate trends, and characterize certain major differences between countries.

The reference groups are (1) the same country group of the subject country and (2) a country group with somewhat higher average income than the country group of the subject country (except for "High Income" Oil Exporters" group where "Middle Income North Africa and Middle East" is chosen because of stronger socio-cultural affinities). In the reference group data the averages are population weighted arithmetic means for each indicator and shown only when majority of the countries in a group has data for that indicator. Since the coverage of countries among the indicators depends on the availability of data and is not uniform, caution must be exercised in relating averages of one indicator to another. These averages are only useful in comparing the value of one indicator at a time among the country and reference groups.

AREA (thousand sq.km.)

Total - Total surface area comprising land area and inland waters; 1960, 1970 and 1980 data.

Agricultural - Estimate of agricultural area used temporarily or permanently for crops, pastures, market and kitchen gardens or to lie fallow; 1960, 1970 and 1980 data.

GNP PER CAPITA (US$) - GNP per capita estimates at current market prices, calculated by same conversion method as World Bank Atlas (1979-81 basis); 1960, 1970, and 1981 data.

ENERGY CONSUMPTION PER CAPITA - Annual apparent consumption of commerical primary energy (coal and lignite, petroleum, natural gas and hydro-, nuclear and geothermal electricity) in kilograms of coal equivalent per capita; 1960, 1970, and 1980 data.

POPULATION AND VITAL STATISTICS

Total Population, Mid-Year (thousands) - As of July 1; 1960, 1970, and 1981 data.

Urban Population (percent of total) - Ratio of urban to total population; different definitions of urban areas may affect comparability of data among countries; 1960, 1970, and 1981 data.

Population Projections

Population in year 2000 - Current population projections are based on 1980 total population by age and sex and their mortality and fertility rates. Projection parameters for mortality rates comprise of three levels assuming life expectancy at birth increasing with country's per capita income level, and female life expectancy stabilizing at 77.5 years. The parameters for fertility rate also have three levels assuming decline in fertility according to income level and past family planning performance. Each country is then assigned one of these nine combinations of mortality and fertility trends for projection purposes.

Stationary population - In a stationary population there is no growth since the birth rate is equal to the death rate, and also the age structure remains constant. This is achieved only after fertility rates decline to the replacement level of unit net reproduction rate, when each generation of women replaces itself exactly. The stationary population size was estimated on the basis of the projected characteristics of the population in the year 2000, and the rate of decline of fertility rate to replacement level.

Year stationary population is reached - The year when stationary population size will be reached.

Population Density

Per sq. km. - Mid-year population per square kilometer (100 hectares) of total area; 1960, 1970, and 1980 data.

Per sq. km. agricultural land - Computed as above for agricultural land only; 1960, 1970 and 1980 data.

Population Age Structure (percent) - Children (0-14 years), working-age (15-64 years), and retired (65 years and over) as percentages of mid-year population; 1960, 1970, and 1981 data.

Population Growth Rate (percent) - total - Annual growth rates of total mid-year population for 1950-60, 1960-70, and 1970-81.

Population Growth Rate (percent) - urban - Annual growth rates of urban populations for 1950-60, 1960-70, and 1970-81.

Crude Birth Rate (per thousand) - Annual live births per thousand of mid-year population; 1960, 1970, and 1981 data.

Crude Death Rate (per thousand) - Annual deaths per thousand of mid-year population; 1960, 1970, and 1981 data.

Gross Reproduction Rate - Average number of daughters a woman will bear in her normal reproductive period if she experiences present age-specific fertility rates; usually five-year averages ending in 1960, 1970, and 1981.

Family Planning - Acceptors, Annual (thousands) - Annual number of acceptors of birth-control devices under auspices of national family planning program.

Family Planning - Users (percent of married women) - Percentage of married women of child-bearing age (15-44 years) who use birth-control devices to all married women in same age group.

FOOD AND NUTRITION

Index of Food Production per Capita (1969-71=100) - Index of per capita annual production of all food commodities. Production excludes seed and feed and is on calendar year basis. Commodities cover primary goods (e.g. sugarcane instead of sugar) which are edible and contain nutrients (e.g. coffee and tea are excluded). Aggregate production of each country is based on national average producer price weights; 1961-65, 1970, and 1981 data.

Per capita supply of calories (percent of requirements) - Computed from energy equivalent of net food supplies available in country per capita per day. Available supplies comprise domestic production, imports less exports, and changes in stock. Net supplies exclude animal feed, seeds, quantities used in food processing, and losses in distribution. Requirements were estimated by FAO based on physiological needs for normal activity and health considering environmental temperature, body weights, age and sex distribution of population, and allowing 10 percent for waste at household level; 1961-65, 1970 and 1980 data.

Per capita supply of protein (grams per day) - Protein content of per capita net supply of food per day. Net supply of food is defined as above. Requirements for all countries established by USDA provide for minimum allowances of 60 grams of total protein per day and 20 grams of animal and pulse protein, of which 10 grams should be animal protein. These standards are lower than those of 75 grams of total protein and 23 grams of animal protein as an average for the world, proposed by FAO in the Third World Food Survey; 1961-65, 1970 and 1980 data.

Per capita protein supply from Animal and pulse - Protein supply of food derived from animals and pulses in grams per day; 1961-65, 1970 and 1977 data.

Child (ages 1-4) Death Rate (per thousand) - Annual deaths per thousand in age group 1-4 years, to children in this age group; for most developing countries data derived from life tables; 1960, 1970 and 1981 data.

HEALTH

Life Expectancy at Birth (years) - Average number of years of life remaining at birth; 1960, 1970 and 1981 data.

Infant Mortality Rate (per thousand) - Annual deaths of infants under one year of age per thousand live births; 1960, 1970 and 1981 data.

Access of Safe Water (percent of population) - total, urban, and rural - Number of people (total, urban, and rural) with reasonable access to safe water supply (includes treated surface waters or untreated but uncontaminated water such as that from protected boreholes, springs, and sanitary wells) as percentages of their respective populations. In an urban area a public fountain or standpost located not more than 200 meters from a house may be considered as being within reasonable access of that house. In rural areas reasonable access would imply that the housewife or members of the household do not have to spend a disproportionate part of the day in fetching the family's water needs.

Access to Excreta Disposal (percent of population) - total, urban, and rural - Number of people (total, urban, and rural) served by excreta disposal as percentages of their respective populations. Excreta disposal may include the collection and disposal, with or without treatment, of human excreta and waste-water by water-borne systems or the use of pit privies and similar installations.

Population per Physician - Population divided by number of practicing physicians qualified from a medical school at university level.

Population per Nursing Person - Population divided by number of practicing male and female graduate nurses, assistant nurses, practical nurses and nursing auxiliaries.

Population per Hospital Bed - total, urban, and rural - Population (total, urban, and rural) divided by their respective number of hospital beds available in public and private general and specialized hospital and rehabilitation centers. Hospitals are establishments permanently staffed by at least one physician. Establishments providing principally custodial care are not included. Rural hospitals, however, include health and medical centers not permanently staffed by a physician (but by a medical assistant, nurse, midwife, etc.) which offer in-patient accommodation and provide a limited range of medical facilities. For statistical purposes urban hospitals include WHOs principal/general hospitals, and rural hospitals, local or rural hospitals and medical and maternity centers. Specialized hospitals are included only under total.

Admissions per Hospital Bed - Total number of admissions to or discharges from hospitals divided by the number of beds.

HOUSING

Average Size of Household (persons per household) - total, urban, and rural - A household consists of a group of individuals who share living quarters and their main meals. A boarder or lodger may or may not be included in the household for statistical purposes.

Average number of persons per room - total, urban, and rural average number of persons per room in all urban, and rural occupied conventional dwellings, respectively. Dwellings exclude non-permanent structures and unoccupied parts.

Access to Electricity (percent of dwellings) - total, urban, and rural - Conventional dwellings with electricity in living quarters as percentage of total, urban, and rural dwellings respectively.

EDUCATION

Adjusted Enrollment Ratios

Primary school - total, male and female - Gross total, male and female enrollment of all ages at the primary level as percentages of respective primary school-age populations; normally includes children aged 6-11 years but adjusted for different lengths of primary education; for countries with universal education enrollment may exceed 100 percent since some pupils are below or above the official school-age.

Secondary school - total, male and female - Computed as above; secondary education requires at least four years of approved primary instruction; provides general, vocational, or teacher training instructions for pupils usually of 12 to 17 years of age; correspondence courses are generally excluded.

Vocational enrollment (percent of secondary) - Vocational institutions include technical, industrial, or other programs which operate independently or as departments of secondary institutions.

Pupil-teacher ratio - primary, and secondary - Total students enrolled in primary and secondary levels divided by numbers of teachers in the corresponding levels.

Adult literacy rate (percent) - Literate adults (able to read and write) as a percentage of total adult population aged 15 years and over.

CONSUMPTION

Passenger Cars (per thousand population) - Passenger cars comprise motor cars seating less than eight persons; excludes ambulances, hearses and military vehicles.

Radio Receivers (per thousand population) - All types of receivers for radio broadcasts to general public per thousand of population; excludes unlicensed receivers in countries and in years when registration of radio sets was in effect; data for recent years may not be comparable since most countries abolished licensing.

TV Receivers (per thousand population) - TV receivers for broadcast to general public per thousand population; excludes unlicensed TV receivers in countries and in years when registration of TV sets was in effect.

Newspaper Circulation (per thousand population) - Shows the average circulation of "daily general interest newspaper", defined as a periodical publication devoted primarily to recording general news. It is considered to be "daily" if it appears at least four times a week.

Cinema Annual Attendance per Capita per Year - Based on the number of tickets sold during the year, including admissions to drive-in cinemas and mobile units.

LABOR FORCE

Total Labor Force (thousands) - Economically active persons, including armed forces and unemployed but excluding housewives, students, etc., covering population of all ages. Definitions in various countries are not comparable; 1960, 1970 and 1981 data.

Female (percent) - Female labor force as percentage of total labor force.

Agriculture (percent) - Labor force in farming, forestry, hunting and fishing as percentage of total labor force; 1960, 1970 and 1981 data.

Industry (percent) - Labor force in mining, construction, manufacturing and electricity, water and gas as percentage of total labor force; 1960, 1970 and 1981 data.

Participation Rate (percent) - total, male, and female - Participation or activity rates are computed as total, male, and female labor force as percentages of total, male and female population of all ages respectively; 1960, 1970, and 1981 data. These are based on ILO's participation rates reflecting age-sex structure of the population, and long time trend. A few estimates are from national sources.

Economic Dependency Ratio - Ratio of population under 15 and 65 and over to the total labor force.

INCOME DISTRIBUTION

Percentage of Private Income (both in cash and kind) - Received by richest 5 percent, richest 20 percent, poorest 20 percent, and poorest 40 percent of households.

POVERTY TARGET GROUPS

The following estimates are very approximate measures of poverty levels, and should be interpreted with considerable caution.

Estimated Absolute Poverty Income Level (US$ per capita) - urban and rural - Absolute poverty income level is that income level below which a minimal nutritionally adequate diet plus essential non-food requirements is not affordable.

Estimated Relative Poverty Income Level (US$ per capita) - urban and rural - Rural relative poverty income level is one-third of average per capita personal income of the country. Urban level is derived from the rural level with adjustment for higher cost of living in urban areas.

Estimated Population Below Absolute Poverty Income Level (percent) - urban and rural - Percent of population (urban and rural) who are "absolute poor".

Economic and Social Data Division
Economic Analysis and Projections Department
May 1983

Population: 39,331 (mid-1982, thousands)
GNP Per Capita: US$1,679 (1982)

KOREA - ECONOMIC INDICATORS

Indicator	Amount (million US$ at current prices) 1982 /a	Annual growth rates (%) at constant prices — Actual 1978	1979	1980	1981	1982	Projected 1988
NATIONAL ACCOUNTS							
Gross domestic product	68,418	11.3	7.1	-3.5	7.1	5.3	7.5
Agriculture	11,185	-4.0	6.7	-22.0	22.0	3.8	4.0
Industry	26,747	20.8	8.4	-0.1	5.3	6.1	8.5
Services	30,486	11.0	6.0	-2.4	3.6	4.8	8.0
Consumption	51,487	11.0	7.4	-1.0	3.7	3.6	6.7
Gross investment	17,514	35.9	17.5	-24.4	5.0	0.1	7.5
Exports of GNFS	26,575	17.5	-3.6	9.9	17.2	4.6	9.5
Imports of GNFS	27,215	29.1	8.6	-7.7	8.5	-0.1	8.6
Gross national savings	14,531	14.1	3.7	-17.7	3.0	18.2	9.4
PRICES							
GDP deflator (1975 = 100)		164.6	197.4	246.7	286.2	309.1	464.1
Exchange rate (US$1 =)		484.0	484.0	607.6	681.0	731.1	
Export price index (1975 = 100)		135.4	161.8	170.3	174.5	167.1	238.7
Import price index (1975 = 100)		105.8	129.2	163.9	171.7	158.4	233.3
Terms of trade index (1975 = 100)		128.0	125.2	103.9	101.6	105.5	102.3

	Share of GDP at market prices (%) (at current prices) 1960	1970	1975	1980	1985	1990	Average annual increase (%) (at constant prices) 1960-70	1970-75	1975-80	1980-85	1985-90
Gross domestic product	100.0	100.0	100.0	100.0	100.0	100.0	8.6	9.8	8.2	7.0	7.5
Agriculture	36.7	26.9	24.5	16.5	15.9	12.4	4.3	4.9	-1.2	7.3	4.0
Industry	20.1	29.5	33.8	41.3	44.4	49.2	17.4	15.3	13.5	8.5	8.4
Services	43.2	43.6	41.7	42.3	39.7	38.3	8.1	7.7	7.6	6.7	7.7
Consumption	85.3	83.0	80.1	76.4	65.7	58.1	6.7	7.8	7.1	5.7	7.0
Gross investment	11.0	26.9	29.0	30.2	33.2	33.8	23.6	11.2	14.6	6.0	7.5
Exports of GNFS	3.4	14.3	27.6	35.7	43.7	49.6	29.3	25.4	16.1	9.8	9.5
Imports of GNFS	12.8	24.1	36.3	42.7	42.6	43.9	20.2	15.8	17.0	6.8	8.9
Gross national savings	8.0	19.5	20.6	21.7	-	-	17.2	14.6	9.0	12.7	9.2

PUBLIC FINANCE	As % of GDP 1960	1970	1975	1980
Current revenues	18.5	17.8	17.9	19.9
Current expenditures	14.3	13.1	15.4	15.6
Current surplus	4.2	4.7	2.5	4.3
Capital expenditure	3.4	6.4	6.4	5.9
Foreign financing	...	1.0	1.3	1.0

Labor Force in 1980	Millions	(%)
Agriculture	4.7	32.2
Industry	3.9	27.1
Services	5.1	35.5
Unemployed	0.7	5.2
Total Labor Force	14.5	100.0

OTHER INDICATORS	1960-70	1970-75	1975-80	1980-85	1985-90
Annual GNP growth rate (%)	8.7	9.0	7.9	7.0	7.6
Annual GNP per capita growth rate (%)	5.9	6.9	5.2	5.5	6.1
Annual energy consumption growth rate (%)	14.2	9.6	8.7	5.7	6.0
ICOR	1.9	2.7	5.4	4.2	4.2
Marginal savings rate	0.3	0.3	0.3	0.3	0.3
Import elasticity	2.2	1.6	2.0	1.2	1.2

East Asia and Pacific Regional Office
February 1984

Population: 39,331 (mid-1982, thousands)
GNP Per Capita: US$1,679 (1982)

KOREA - BALANCE OF PAYMENTS, EXTERNAL CAPITAL AND DEBT
(million US$ at current prices)

Indicator	Actual							Projected
	1970	1975	1978	1979	1980	1981	1982	1988
BALANCE OF PAYMENTS								
Exports of goods and services	1,379	5,909	17,124	19,523	22,587	27,552	28,500	70,972
Of which: merchandise f.o.b.	882	5,028	12,678	14,694	17,220	20,938	20,961	52,145
Imports of goods and services	2,180	7,992	18,651	24,115	28,360	32,476	31,500	74,003
Of which: merchandise f.o.b.	1,804	6,671	14,436	19,266	21,604	24,337	23,361	58,616
Net transfers	178	225	467	439	449	506	473	500
Current account balance	-623	-1,858	-1,060	-4,153	-5,325	-4,418	-2,546	-2,531
(% of GNP)	(-7.2)	(-9.2)	(-2.2)	(-7.1)	(-9.3)	(-7.4)	(-3.9)	(-1.6)
Direct investment	66	53	61	17	-5	59	100	250
MLT loans (net)	242	1,252	2,216	2,945	2,096	4,267	2,051	2,294
Official	147	486	663	852	689	1,337	880	635
Private	95	765	1,552	2,093	1,408	2,929	1,171	1,659
Other capital (incl. errors & omissions)	372	929	-510	2,090	3,770	367	484	1,643
Change in reserves	-57	-376	-707	-898	-536	-275	-98	-1,657
International reserves (gross)	606	2,012	5,405	6,303	6,839	7,114	7,212	14,387
Reserves as months imports	3.3	3.0	3.5	3.1	2.9	2.6	2.7	2.3
EXTERNAL CAPITAL AND DEBT								
Gross disbursements								
Official grants	-	-	-	-	-	-	50	
Concessional loans	123	123	184	193	138	159	148	
DAC	122	108	167	173	121	158	148	
OPEC	-	-	13	20	17	1	--	
IDA	1	14	3	-	-	-	--	
Other	-	1	-	-	-	-	--	
Non-concessional loans	317	1,511	3,729	4,448	3,655	4,779	3,937	
Official export credits	18	151	219	341	606	844	532	
IBRD	7	187	321	426	254	306	438	
Other multilateral	5	87	89	91	90	104	116	
Private	287	1,083	3,101	3,591	2,705	3,525	2,851	
Medium- and Long-Term Debt								
Debt outstanding and disbursed	1,797	5,540	11,937	14,553	16,274	19,964	22,006	
Official	613	2,657	5,016	5,667	6,498	7,702	8,572	
Private	1,185	2,883	6,921	8,886	9,776	12,263	13,433	
Undisbursed	902	1,679	6,294	5,337	7,072	5,996	5,324	
Debt Service on MLT Loans								
Total service payments	268	667	1,825	2,578	2,762	3,597	4,199	
Interest	70	283	657	890	1,310	1,777	2,164	
Payments as % exports	19.4	11.3	10.7	13.2	12.2	13.0	14.5	
Short-Term Debt								
Debt outstanding and disbursed	...	2,409	3,575	6,279	10,047	13,658	14,100	
Interest payments	...	...	236	377	907	1,810	1,528	
Interest as % exports	...	...	1.4	1.9	4.0	6.7	5.3	
Average Interest Rate on New Loans (%)								
Official	4.5	7.9	7.4	7.6	7.5	8.4	8.0	
Private	7.1	9.3	9.7	11.4	14.0	13.6	13.7	
Average Maturity of New Loans (years)								
Official	28.0	19.3	19.6	16.8	19.6	15.3	15.5	
Private	10.9	5.7	10.9	10.7	11.2	13.1	8.1	

	As % of debt outstanding at end of most recent year (1982)
Maturity structure of debt outstanding	
Maturities due within 5 years	61
Maturities due within 10 years	103
Interest structure of debt outstanding	
Interest due within first year	9

East Asia and Pacific Regional Office
February 1984

KOREA

THE STATUS OF BANK GROUP OPERATIONS IN THE REPUBLIC OF KOREA /a

A. Statement of Bank Loans and IDA Credits (as of March 31, 1984)

Loan or Credit Number	Calendar Year	Borrower	Purpose	Amount ($ million) (less cancellations) Bank	TW	IDA	Undisbursed
Thirty-nine loans and eight credits fully disbursed				2,051.77	40.00	115.58	
1319	1976	ADC	Irrigation	29.0			1.03
1364	1977	ADC	Irrigation	95.0			9.35
1401	1977	Republic of Korea	Ports II	67.0			1.12
1503	1978	ADC	Agriculture/Irrigation	36.0			10.74
1530	1978	Republic of Korea	Rural Infrastructure II	95.0			2.15
1640	1978	Republic of Korea	Highways IV	143.0			2.43
1666	1979	Republic of Korea	Chungju Multipurpose	125.0			21.74
1676	1979	Republic of Korea	Electronics Technology	29.0			8.47
1758	1979	Republic of Korea	Second Gwangju Regional	65.0			21.22
1774	1979	Republic of Korea	Population I	30.0			24.83
1788	1979	Korea Electric Co.	Power	115.0			16.08
1800	1980	Republic of Korea	Education V	100.0			16.08
1829	1980	CNB I	Dev. Finance Co.	30.0			0.53
1836	1980	Republic of Korea	Railway VII	94.0			5.87
1851	1980	AFDC	Agriculture II	50.0			8.22
1932	1981	KLTCB VIII	Div. Finance Co.	90.0			11.84
1933	1981	KDB IV	Div. Finance Co.	100.0			2.60
1974	1981	Republic of Korea	Third Agriculture Credit	50.0			2.15
1980	1981	Republic of Korea	Nat. Urban Land & Housing	90.0			43.79
2004	1871	SNUV IV	Dev. Finance Co.	60.0			19.78
2072	1982	Republic of Korea	Water Supply	90.0			47.93
2111	1982	Republic of Korea	Agricultural Marketing	50.0			35.03
2112	1982	KTDC	Technology Development	50.0			26.66
2144	1982	CNB	DFC	30.0			19.07
2215	1982	Republic of Korea	Machinery Industry	70.0			66.70
2216	1982	Republic of Korea	Nat. Urban Land and Housing	100.0			94.78
2228	1982	Republic of Korea	Provincial and County Roads	125.0			104.29
2267	1983	Republic of Korea	Coal and Cement Distribution	122.0			121.67
2309	1983	Republic of Korea	Industrial Finance	255.0			243.74
2350	1983	Republic of Korea	Second Water Supply	78.5			72.38
2354	1983	Republic of Korea	Second Structural Adjustment	300.0			100.00
2388	1984	Republic of Korea	Iconju Regional Development	60.0			60.00
2392	1984	Republic of Korea	Highway Sector	230.0			230.00
	Total			5,105.27	40.00	115.58	1,452.27
	of which has been repaid			608.96	2.16	5.85	
	Total now outstanding			4,496.32	37.84	109.74	
	Amount sold		8.83				
	of which has been repaid		8.83	-	-	-	
	Total now held by Bank and IDA (prior to exchange adjustment)			4,496.32	37.84	109.74	
	Total undisbursed			1,452.27	-	-	1,452.27

/a The status of the projects listed in Part A are described in a separate report on all Bank/IDA-financed projects in execution, which is updated twice yearly and circulated to the Executive Directors on April 30 and October 31.

B. Statement of IFC Investments (as of March 31, 1984)

Fiscal Year	Obligor	Types of Business	Amount ($ million) Loan	Equity	Total
1968	KDFC	Development Financing	-	0.7	0.7
1969	Honam Silk Co.	Textiles	1.4	0.3	1.7
1970	Atlas Paper	Pulp and paper	4.5	0.5	5.0/a
1971	Korea Investment Finance Corp.	Capital Market Development	-	0.7	0.7
1974	KDFC	Development Financing	-	0.4	0.4
1974	Korea Investment Finance Corp.	Capital Market Development	-	0.3	0.3
1975	Gold Star & Co. Ltd.	Electronic Products	16.0	1.3	17.3
1975	Korea Securities Finance Corp.	Capital Market Development	5.0	0.6	5.6
1975	Tong Yang Nylon Company, Ltd.	Synthetic Fibers	6.9	2.1	9.0
1975	Hae Un Dae Development Company Ltd.	Tourism	2.8	0.7	3.5
1976	Korea Investment Finance Corp.	Capital Market Development	-	0.4	0.4
1976	Chonju Paper Mfg. Co.	Paper	5.0	0.5	5.5
1976	Korea Zinc. Co. Ltd.	Zinc	15.0	4.0	19.0
1976	KDFC	Development Financing	17.8	-	17.8
1976	Gold Star & Co. Ltd.	Electronic Products	10.0	0.4	10.4
1977	Gold Star & Co. Ltd.	Electronic Products	-	0.2	0.2
1977	KDFC	Development Financing	-	0.3	0.3
1977	Korea Securities Finance Corp.	Capital Market	-	0.5	0.5
1977	Korea Development Leasing Corp.	Capital Market	15.0	0.4	15.4
1978	KDFC	Development Financing	-	1.1	1.1
1979	Gold Star & Co. Ltd.	Electronic Products	-	1.7	1.7
1979	KIFC	Capital Market	-	0.6	0.6
1979	Korea Development Leasing Corp		-	0.2	0.2
1979	Gold Star & Co. Ltd.	Electronic Products	-	1.5	1.5
1980/84	Gold Star & Co. Ltd.	Electronic Products	-	2.8	2.8
1980	Korea Investment Finance Corp.	Capital Market	-	0.6	0.6
1980/ 82/84	Korea Securities Finance Corp.		-	2.3	2.3
1980	KDFC	Development Financing	-	2.2	2.2
1981	Taihan Bulk Terminal Co. Ltd.	Grain Port Terminal	7.0	2.5	9.5
1982	KIFC	Capital Market	-	0.6	0.6
1982	K-TAC (Korea Technology Advancement Corp.)	Research & Development	-	0.6	0.6
1983	KDIC	Money & Capital Market	-	0.9	0.9
	Total gross commitment		106.4	31.9	138.3
	less cancellations, terminations repayment and sales		92.2	5.6	97.8
	Total commitments now held by IFC		14.2	26.3	40.5
	TOTAL undisbursed		-	--	-

/a Cancelled at the request of the Company.

ANNEX III

KOREA

SCIENCE AND TECHNOLOGY EDUCATION SECTOR PROGRAM

Supplemental Program Data Sheet

Section I: Timetable of Key Events

(a)	Time taken by the country to prepare the program	12 months
(b)	Program prepared by	The Government
(c)	Date of first mission to consider the program	April 1982
(d)	Appraisal mission	October 1983
(e)	Completion of negotiations	April 1984
(f)	Planned loan effectiveness	August 1984

Section II: Special Bank Implementation Actions

The Government and the Bank to undertake a comprehensive program mid-term review by October 31, 1987.

Section III: Special Conditions

(a) The Ministry of Education (MOE), the Korea Advanced Institute of Science and Technology (KAIST) and the Korea Science and Engineering Foundation (KOSEF) to open special accounts at the Korea Exchange Bank for disbursement under their respective categories as a condition of loan disbursement (para. 64);

(c) Government to prepare reports for annual and in-depth mid-term review of progress measured against key performance indicators and annual and interim targets (para. 57).

IBRD 12351R2

MAY 1983